WA-10-1030

95-e14

DEPARTMENT OF ECOLOGY

September 27, 1995

TO: Kathy Cupps
Water Quality Program, SWRO

FROM: Greg Pelletier
EILS Program, Watershed Assessments Section

SUBJECT: Revised continuous simulation of ammonia WLAs during November-April for the City of Enumclaw NPDES permit

Summary

This memorandum presents a revised analysis of waste load allocations (WLAs) for ammonia for the discharge to the White River by the City of Enumclaw during November-April using dynamic modeling techniques. The use of continuous simulation models was proposed by the city of Enumclaw in their June 1995 Appellant Settlement Plan for NPDES Permit Number WA-002057-5. The revisions in this memo supplement analyses presented in a previous memo (Pelletier, 1995.) The revisions were made to incorporate comments by Bill Fox (Cosmopolitan Engineering Group.) WLAs based on continuous simulation were compared with WLAs based on two independent steady-state analyses from the following sources:

- WLAs proposed by Ecology in the draft NPDES permit; and
- WLAs proposed in an attachment to the Appellant Settlement Plan by a consultant to the City of Enumclaw (originally contained in a November 18, 1994 memo to the City of Enumclaw by Bill Fox, Cosmopolitan Engineering)

Proposed WLAs to meet acute and chronic aquatic life criteria during November-April are presented in the following table with the corresponding daily maximum and monthly average limits for effluent concentrations (all units are mg/L of total ammonia as N):

	Acute WLA	Chronic WLA	Daily Maximum	Monthly Average
Proposed in the draft NPDES permit based on steady-state analysis:	9.1	5.4	9	4
Proposed in the Appellant Settlement Plan based on steady-state analysis by Bill Fox:	15.4	8.58	14.1	8.6
Continuous simulation in this memo:	13.14	7.30	12.0	5.2

The continuous simulation predicts a time series of allowable effluent concentrations of ammonia based on actual combinations of river flow and effluent flow during the November-April permit period between 1987 and 1995. The proposed WLAs and permit limits based on continuous simulation are predicted to protect the magnitude, duration, and frequency requirements of the water quality standard for un-ionized ammonia in the White River. The limits proposed in the draft NPDES permit are more restrictive than the continuous simulation results and also are predicted to protect the water quality standard. The results of continuous simulation may be used for the NPDES permit. The limits proposed in the Appellant Settlement Plan based on steady-state analysis by Bill Fox were not predicted to meet the water quality standard.

The following sections of this memo present the results of continuous simulation modeling in detail.

Introduction

The ammonia limits in the draft NPDES permit for the November-April season are based on steady-state modeling using a combination of expected maximum effluent flows (*e.g.* 4.0 mgd for evaluation of limits to meet acute criteria) and expected minimum river flows (110 cfs). This combination of conditions is consistent with Ecology and EPA guidance for steady-state modeling of WLAs (Ecology, 1991; Ecology, 1994; EPA, 1991). The Appellant Settlement Plan proposed the use of continuous simulation to develop WLAs from realistic combinations of river and effluent flows.

EPA defines steady-state and continuous simulation as follows (EPA, 1991):

- *steady-state model* is a fate and transport model that uses constant values of input variables to predict constant values of receiving water quality concentrations.

- *continuous simulation model* is a fate and transport model that uses time series input data to predict receiving water quality concentrations in the same chronological order as that of the input variables

An analysis by Bill Fox in a November 18, 1994 memo to the City of Enumclaw (Fox, 1994), which is attached to the Appellant Settlement Plan, uses constant values of input variables to predict constant values of effluent concentrations which correspond to constant values of receiving water quality concentrations. Therefore, the analysis in the plan is a steady-state analysis by EPA's definition. Furthermore, the steady-state input variables selected in the analysis in the plan are not consistent with Ecology guidance (Ecology, 1991; Ecology, 1994), and are not consistent with the EPA guidance cited in the plan (EPA, 1991).

The analysis in the plan also does not predict receiving water quality concentrations or corresponding effluent concentrations in the same chronological order as that of the input variables. This additionally confirms that the analysis in the plan is not a continuous simulation according to EPA guidance. Further, EPA recommends that application of dynamic modeling techniques (including continuous simulation) should incorporate the return frequency requirements of the standards. The return frequency provision of the standards is neglected in the steady-state analysis presented in the plan.

It may be appropriate to consider alternative ammonia limits for the Enumclaw discharge by application of some of the principles of continuous simulation or dynamic modeling techniques. However, the analysis presented in the plan is not an acceptable application of methods suggested by EPA guidance.

A dynamic method which applies continuous simulation techniques that are consistent with Ecology and EPA guidance was developed by Ecology and presented in a previous memo (Pelletier, 1995.) Bill Fox proposed an alternative initial dilution model for use in the continuous simulation (Appendix A.) The initial dilution model proposed by Fox (approach 2 in Appendix A) is appropriate for application to the Enumclaw discharge. This memo documents a revised analysis of the continuous simulation which incorporates the modified initial dilution model. WLAs for ammonia based on the results of the revised continuous simulation are presented below.

Methods and Results

Continuous simulation models use time series input data to predict an output variable in the same chronological order as that of the input variables. The continuous simulation analysis documented in this memo uses time series values of input variables to predict time series values of maximum effluent concentrations which correspond to acceptable receiving water quality concentrations. The resulting time series of maximum allowable effluent concentrations were then summarized to select statistics which correspond to the specified magnitude, duration, and frequency of the water quality standard for ammonia.

The results of the continuous simulation are presented in Appendix B. The continuous simulation was accomplished by the following steps:

- *Step 1: Tabulate daily values of river and effluent flows for the November-April season from 1987 through 1995.* The period of record was selected to contain data which represent current operations of the diversion from the White River at Buckley to Lake Tapps by Puget Sound Power and Light Company. Daily stream flow records were

obtained from the US Geological Survey ADAPS database system. Daily effluent flows were obtained from Discharge Monitoring Reports for the NPDES permit.

- *Step 2: Calculate the maximum allowable dilution factors for each daily combination of river and effluent flows based on maximum percentages of river flows allowed in WAC 173-201A-100.* The mixing zone rule in the water quality standards allows no more than 25 percent of the river flow to be used to meet the chronic criteria and no more than 2.5 percent to meet the acute criteria. The maximum allowable dilution factors (DF) based on upstream river flows (Q_u in cfs from USGS station 12100000) and effluent flows (Q_e in cfs) were estimated as follows for each daily combination of river and effluent flow:

$$DF_{acute} = (0.025Q_u + Q_e)/Q_e$$

$$DF_{chronic} = (0.25Q_u + Q_e)/Q_e$$

Step 3: Estimate dilution factors at the boundaries of the acute and chronic mixing zone for each daily combination of river and effluent flows using a modification of Ecology's RIVPLUM model proposed by Bill Fox. Velocity (u in feet/sec) and depth (d in feet) were estimated based on relationships with river flow ($Q=Q_u+Q_e$ in cfs downstream from the effluent discharge) presented in Pelletier (1993): $u=0.095Q^{0.56}$; and $d=0.19Q^{0.3}$. River width was calculated based on continuity as Q/(du). Other input variables for the modified RIVPLUM model were similar to those documented by Fox (1994).

The RIVPLUM model is based on the equations developed by Fischer *et al.* 1979 (*Mixing in Inland and Coastal Waters*, 1979, Academic Press.) Bill Fox proposed a modification of the Fischer *et al.* equations to account for possible underestimation of dilution near the effluent outfall (Appendix A.) The general approach is based on discussion in Section 5.1.3 of the book by Fischer *et al.* The coordinate system and nomenclature are as illustrated in Figure 5.4 and Section 5.1.3 of Fischer *et al.* (x = distance downstream, y = distance across the channel, C = effluent volume fraction or pollutant concentration in the river, C_e = effluent concentration.)

The dilution model is based on considering a rectangular channel of depth d into which is discharged M units of mass of effluent per unit time in the form of a vertical line source. A line source of M units into a flow of depth d is equivalent to a point source of strength M/d in a two-dimensional flow for which the concentration C is as follows from Fischer *et al.* equation 5.7 and 5.9 (assuming discharge at the stream bank, y=0):

$$C = [\, 2M / ud(4\pi\varepsilon_t x/u)^{1/2} \,] \qquad \text{(eqn 1)}$$

If C represents the effluent volume fraction, then the dilution factor is equal to 1/C. In order to apply this equation very close to the effluent outfall, the *effective origin* was estimated as follows:

- If M is estimated as the product of effluent flow and concentration, then from continuity:

$$C_e = M/Q_e \qquad \text{(eqn 2)}$$

- Define x_0 as the distance upstream from the effluent outfall (x=0) to the *effective origin* of effluent such that the concentration at x=0 equals the actual effluent concentration. The *effective origin* x_0 was estimated by substitution of equation 2 into equation 1:

$$M/Q_e = [\, 2M / ud(4\pi\varepsilon_t x_0 / u)^{1/2} \,] \qquad \text{(eqn 3)}$$

- Solve equation 3 for x_0:

$$x_0 = (2Q_e / ud)^2 \, (u / 4\pi\varepsilon_t) \qquad \text{(eqn 4)}$$

- The general equation to predict C for any point downstream near the outfall is then (assuming $C_e = 1$ and $M = Q_e C_e$):

$$C = [\, 2Q_e / ud(4\pi\varepsilon_t \, (x+x_0) / u)^{1/2} \,] \qquad \text{(eqn 5)}$$

The acute and chronic dilution factors (DF_{acute} and $DF_{chronic}$) were estimated in Step 3 as 1/C from equation 5 for x=30 feet (for acute) and x=300 feet (for chronic.) An example of the dilution calculations is presented in Appendix C.

- *Step 4: Select the most limiting acute and chronic dilution factors for each daily combination of river and effluent flows.* The lowest dilution factor from Step 2 and 3 was selected for each mixing zone boundary (acute and chronic) for each daily combination of river and effluent flows.

- *Step 5: Calculate the maximum allowable effluent concentrations which would meet the acute and chronic ammonia criteria for each daily combination of river and effluent flows.* The acute and chronic WLAs for effluent ammonia were calculated for each daily combination of river and effluent flows as the maximum effluent concentrations which would meet the acute and chronic criteria in the river. It was necessary to assume constant values for ammonia criteria and upstream ammonia concentrations because time series

data were not available. This assumption was also made by Fox (1994). Conservative estimates of ammonia criteria and upstream concentrations were selected based on the critical 10th or 90th percentile for the season. The acute and chronic criteria were assumed to be 9.1 and 1.7 mg/L of ammonia as N, which are the same criteria assumed by Fox (1994) and also used in the draft NPDES permit (seasonal 10th percentiles). The upstream background concentration of ammonia was assumed to equal 0.1 mg/L as N, which was also assumed by Fox (1994) and used in the draft NPDES permit (seasonal 90th percentile). The acute and chronic WLAs (in mg/L of ammonia as N) for each daily effluent dilution factor from Step 4 were estimated by mass balance as follows:

$$\text{Acute WLA} = 9.1\ DF_{acute} - 0.1\ (DF_{acute} - 1)$$

$$\text{Chronic WLA} = 1.7\ DF_{chronic} - 0.1\ (DF_{chronic} - 1)$$

- *Step 6: Calculate 4-day running averages of chronic WLAs to correspond with the duration specified in the water quality standards.* The chronic criteria for ammonia is specified as a 4-day average duration. Therefore, 4-day running averages of the chronic WLAs from Step 5 were calculated for application of the chronic criteria.

- *Step 7: Calculate the acute and chronic WLAs which correspond to the allowable return period specified in the water quality standards.* The water quality standards specify that that the ammonia criteria are concentrations which must not be exceeded more than once every 3 years on average. Therefore, an annual return period of 3 years was used to evaluate the acute and chronic WLAs. The time series of acute and 4-day-average chronic WLAs were summarized to select WLAs that correspond to the specified return periods.

Evaluation of seasonal permit periods requires consideration of the annual probability of violating water quality standards under a seasonal program compared with year-round programs (Rossman, 1989; Lence *et al.*, 1990). The goal for seasonal permit programs is to maintain risk equivalency with a non-seasonal year-round permit program (Ecology, 1992). For example, Rossman (1989) noted that if the same return period is used for monthly and annual permit programs, then there is a greatly increased risk of violating water quality standards in the monthly compared with year-round program. Hatcher (1982) showed a seven-fold increase in water quality violations resulting from monthly permit limits based on monthly 7Q10 flows compared with year-round permits based on annual 7Q10 flows. EPA (1984) suggests adjusting the return period to approximate the same risk in seasonal permit programs as in non-seasonal year-round programs.

The return period for meeting the ammonia criteria during the November-April season was selected to maintain the allowable annual return period. The return period (Y) for seasonal permit periods which corresponds to the allowed annual probability (*e.g.* P=1/3 for an annual three year return period) is related to the number of permitting periods (N) within the year by the following equation (EPA, 1984):

$$Y = \{1 - (1 - P)^{1/N}\}^{-1}$$

Therefore, semi-annual permit periods require that the criteria are not exceeded more than once every 5.4 years in each season to maintain an annual risk of exceeding criteria of no more than once every 3 years. A seasonal return period of 5.4 years was selected for equivalence with an annual return periods of 3 years for evaluation of the acute and chronic WLAs during the November-April permit period.

The acute and chronic WLAs which correspond to an annual return period of 3 years was found by the following method:

- *Step 7a. Select the lowest acute and chronic WLA from the continuous simulation of each November-April period.* For each November-April period between 1987 and 1995 the lowest 1-day average acute WLA and 4-day average chronic WLA were selected. The selected WLAs were also transformed using the base 10 logarithm so that normal and log-normal probability distributions could be evaluated. Both normal and log-normal distributions were found to fit the data equally well (based on normal probability plots implemented in the program WQHYDRO, Aroner, 1992). A log-normal distribution was selected to represent the data based on recommendations by EPA (EPA, 1991).

- *Step 7b. Calculate the acute and chronic WLAs corresponding to the specified return period.* The WLAs which correspond to the annual return period were estimated by frequency analysis (Haan, 1977). The value of the normal deviate (Z) which corresponds to the annual return period of 3 years is 0.902. The acute and chronic WLAs were found by the following formulas from the means and standard deviations of the log-transformed values (μ_{log} and σ_{log}) from Step 7a assuming a log-normal distribution (Haan, 1977; Berthouex and Brown, 1994):

$$\text{acute WLA} = 10^{\wedge}(\mu_{log,acute} - Z\,\sigma_{log,acute})$$

$$\text{chronic WLA} = 10^{\wedge}(\mu_{log,chronic} - Z\,\sigma_{log,chronic})$$

- *Step 8. Calculate the daily maximum and monthly average permit limits corresponding to the acute and chronic WLAs.* The formulas in chapter VI, section 3.3.7 of Ecology's Permit Writer's Manual (Ecology, 1994) were used to calculate the daily maximum and monthly average permit limits corresponding to the acute and chronic WLAs from Step 7b. The assumptions and calculation of the permit limits are presented in Appendix D of this memo.

The recommended WLAs and permit limits for November-April are presented in the following table and compared with WLAs and limits proposed based on steady-state modeling for the draft permit and by Fox (1994) (all units are mg/L of total ammonia as N):

	Acute WLA	Chronic WLA	Daily Maximum Limit	Monthly Average Limit
Proposed in the draft NPDES permit based on steady-state analysis:	9.1	5.4	9	4
Proposed in the Appellant Settlement Plan based on steady-state analysis by Fox (1994):	15.4	8.58	14.1	8.6
Continuous simulation in this memo	13.14	7.30	12.0	5.2

The WLAs and permit limits that are based on continuous simulation are less restrictive than those proposed in the draft permit and substantially more restrictive than those proposed by Fox (1994).

The predicted time-series of acute and chronic WLAs from the continuous simulation are presented in Figures 1 and 2 with comparison to WLAs proposed by Fox (1994) and WLAs calculated from frequency analysis of the continuous simulation (Step 7b). The WLAs proposed by Fox (1994) are found to result in numerous extended periods during which water quality standards would not have been met between 1987 and 1995. Excursions of simulated WLAs below the values proposed by Fox (1994) indicate that water quality standards would not have been met during those periods. Effluent concentrations would need to be lower than the WLAs proposed by Fox to meet the standard during the simulation.

In summary, the proposed WLAs and permit limits based on continuous simulation are predicted to protect the magnitude, duration, and frequency requirements of the water quality standard for un-ionized ammonia in the White River. The limits proposed in the draft NPDES permit are more restrictive than the continuous simulation results and also are predicted to protect the water quality standard. The results of continuous simulation may be used for the NPDES permit. The limits proposed in the Appellant Settlement Plan based on steady-state analysis by Bill Fox were not predicted to meet the water quality standard.

References

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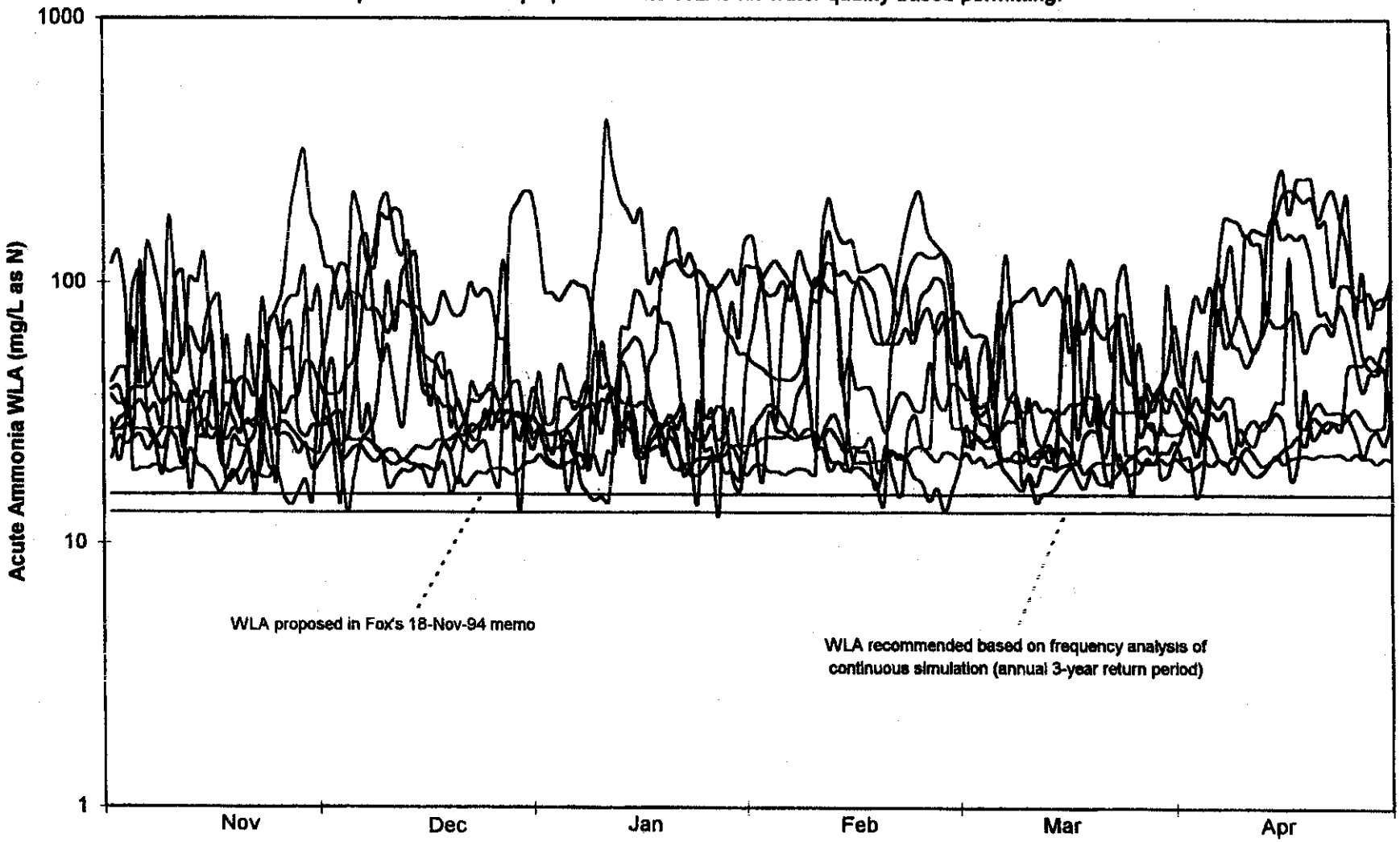
Rossman, L.A., 1989. Risk equivalent seasonal waste load allocation. Water Resources Research, 25(10), 2083-2090.

GP:blt
Attachments

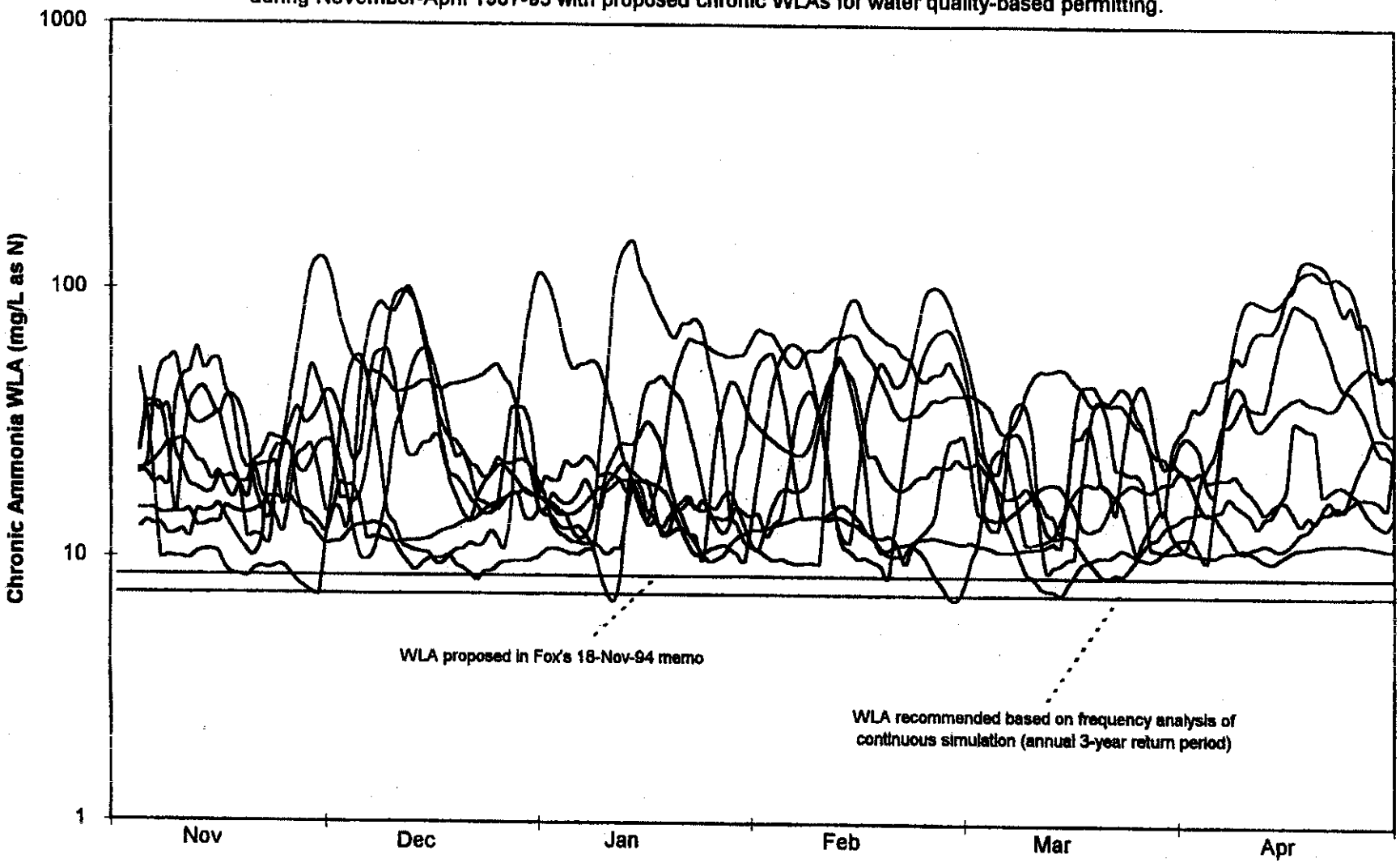
cc: Will Kendra

Figure 1. Acute ammonia WLAs for Enumclaw: comparison of continuously simulated acute WLAs during November-April 1987-95 with proposed acute WLAs for water quality-based permitting.



FOXMODEL.XLS\Chart Acute WLAs, 9/25/95

Figure 2. Chronic ammonia WLAs for Enumclaw: comparison of continuously simulated chronic WLAs (4-day averages) during November-April 1987-95 with proposed chronic WLAs for water quality-based permitting.



FOXMODEL.XLS\Chart Chronic WLAs, 9/25/95

Appendix A

Comments by Bill Fox on Ecology's Continuous Simulation Methodology for the City of Enumclaw NPDES Permit Appeal

MEMORANDUM

Date: August 31, 1995

From: Bill Fox, Cosmopolitan Engineering Group

To: Kathy Cupps, Ecology SWRO

Subject: City of Enumclaw NPDES Permit Appeal

A meeting was conducted on August 30, 1995 at Ecology SWRO to discuss the technical differences between Ecology and Enumclaw regarding the winter ammonia limits. In attendance were (1) Kathy Cupps, Ecology permit writer, (2) Greg Pelletier, Ecology EILS, and (3) myself, representing Enumclaw. The following is a mutually agreed summary of the meeting. Please forward to Mr. Lavigne, and I will do so to Enumclaw and Heller Ehrman.

Interim Winter Ammonia Limit

1. Ecology recalculated the interim winter limits, including data from 1994-95 (memo from K. Cupps to M. Bauer dated August 14, 1995). I agreed that the methodology and results of the Ecology recalculation were consistent with the permit writers's manual and EPA guidance.

Final Winter Ammonia Limit

2. I agreed with the continuous simulation model methodology proposed by Greg Pelletier (memo to K. Cupps dated August 14, 1995), with the exception of two issues:

   a. I stated that the use of the RIVPLUME model is not correct in the near field (*i.e.* acute mixing zone). I contended that the model as proposed by Mr. Pelletier does not account for initial conditions (momentum or volume flux) of the effluent discharge.

   b. I do not concur with the 10-year return period proposed in Mr. Pelletier's memo. I concur with the 3-year, 6-month approach (seasonal 5.4 year return period), consistent with EPA guidance.

3. I proposed a methodology which could be incorporated into Mr. Pelletier's continuous simulation model. The method would use an effective origin to establish initial conditions in the model RIVPLUME to account for initial volume flux of effluent. Momentum of the discharge would continue to be neglected (a conservative assumption).

4. Ecology agreed to consider this approach (items 2b and 3), and will respond to the City of Enumclaw by September 29, 1995. If Ecology concurs, I agreed to recommend the model results to the City.

COSMOPOLITAN
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GROUP

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Job Name Enumclaw
Job Number ENU001
Date 8/29/95
Time 1400

To Greg Pelletier
EILS
Fax (360) 407-6884

From Bill Fox

Message Please (if you have time) consider approach #2 attached, where dilution is set at 1.0 at $x = 0$, $y = 0$ in Fischer eqn 5.9. This could be worked into your continuous simulation spreadsheet. I will present this tomorrow

Civil, Environmental, and Recreational Consulting

Transmittals ___ will X will not be sent.
Total number of pages including this cover page 3

ENGINEERING GROUP
Civil, Environmental, and Recreational Consulting

Job Name Enumclaw Sheet 1 of 2
Job Number ENM001 Checked
By Fox Date 8/29/95 Date

$$[\dot{M}] = \frac{\text{mass}}{\text{time}}$$

@ $t=0, x=0$:

1) $C = \frac{\dot{M}}{Q_e}$ $\left[\frac{\dot{M}}{Q_e}\right] = \frac{\text{mass}}{\text{vol.}}$

$C(x,t)$ · eqn 5.7 Fischer, $y=0$

2) $C = \frac{2\dot{M}}{\bar{u} d \sqrt{4\pi \varepsilon_t \frac{x}{\bar{u}}}}$ $[\ ] = \frac{\text{mass}}{\text{vol}}$

Approach 1

$$C = \frac{2\dot{M}}{\bar{u} d \sqrt{4\pi \varepsilon_t \frac{x}{\bar{u}}} + 2Q_e}$$

Approach 2

"Effective Source"

ψ.0 [define $\hat{x}$ as distance upstream to where conc as defined in eq. 2 equals actual conc in eq. 1. @ $x=0$

$$\frac{\dot{M}}{Q_e} = \frac{2\dot{M}}{\bar{u} d \sqrt{4\pi \varepsilon_t \frac{\hat{x}}{\bar{u}}}} \Rightarrow \text{solving for } \hat{x} \text{ yields:}$$

3) $$\hat{x} = \left(\frac{2Q_e}{\bar{u} d}\right)^2 \frac{\bar{u}}{4\pi \varepsilon_t}$$

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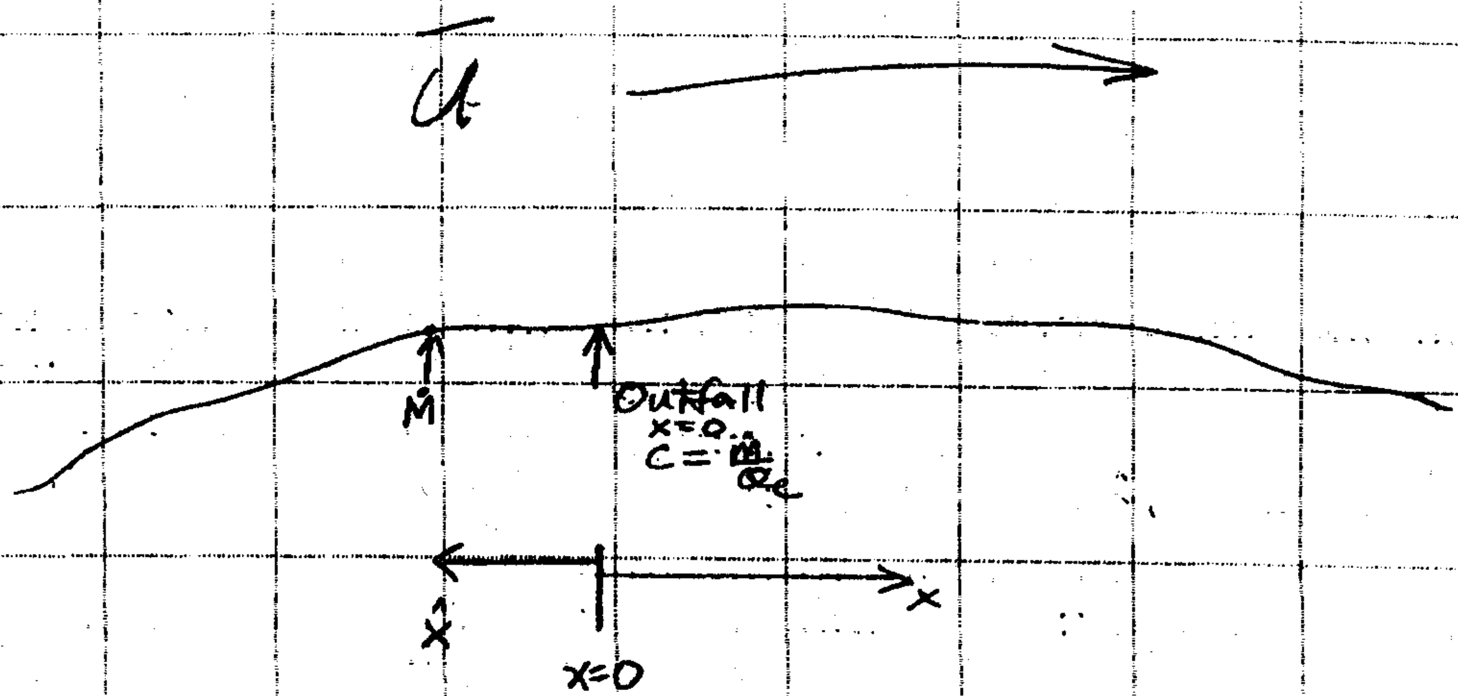
(4) General Equation for $C(x,t)$ @ $y=0$ (℄)

$$C = \frac{2Q_e}{\bar{u}\,d\sqrt{4\pi\varepsilon_t\frac{(x+\hat{x})}{\bar{u}}}} \quad \text{where} \quad \hat{x} = \left(\frac{2Q_e}{ud}\right)^2 \frac{u}{4\pi\varepsilon_t}$$



Appendix B

Results of continuous simulation of ammonia WLAs for the City of Enumclaw during the November-April permit season.

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

				Maximum Allowable Dilution Factors Based on Percentages of River Flow In WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox 1995 Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mg/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs):	River Discharge Rate at USGS 12100600 (cfs)	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mg/L)	Acute (mg/L)	Chronic (mg/L)
01-Nov-87	0.8	1.238	156	32.5	4.2	13.1	4.3	13.1	4.2	21.1	37.5	
02-Nov-87	0.9	1.392	158	29.4	3.8	11.8	3.9	11.8	3.8	19.0	34.6	
03-Nov-87	0.8	1.238	149	31.1	4.0	12.7	4.1	12.7	4.0	20.3	36.2	
04-Nov-87	0.7	1.083	149	35.4	4.4	14.4	4.7	14.4	4.4	23.2	40.1	20.9
05-Nov-87	0.7	1.083	149	35.4	4.4	14.4	4.7	14.4	4.4	23.2	40.1	21.4
06-Nov-87	0.7	1.083	150	35.6	4.5	14.5	4.7	14.5	4.5	23.3	40.3	22.5
07-Nov-87	0.6	0.928	148	40.9	5.0	16.7	5.4	16.7	5.0	26.9	45.0	24.1
08-Nov-87	0.5	0.774	145	47.9	5.7	19.7	6.3	19.7	5.7	31.7	51.3	26.3
09-Nov-87	0.6	0.928	141	39.0	4.8	16.1	5.2	16.1	4.8	25.9	43.3	26.9
10-Nov-87	0.6	0.928	132	36.5	4.6	15.3	4.9	15.3	4.6	24.5	41.1	27.2
11-Nov-87	0.8	1.238	145	30.3	3.9	12.4	4.0	12.4	3.9	19.9	35.5	25.5
12-Nov-87	0.7	1.083	133	31.7	4.1	13.2	4.3	13.2	4.1	21.2	36.7	22.9
13-Nov-87	0.7	1.083	144	34.2	4.3	14.1	4.5	14.1	4.3	22.6	39.0	22.1
14-Nov-87	1.1	1.702	132	20.4	2.9	8.4	2.8	8.4	2.8	13.6	25.5	19.3
15-Nov-87	0.6	0.928	135	37.4	4.6	15.5	5.0	15.5	4.6	25.0	41.8	20.6
16-Nov-87	1.5	2.321	162	18.5	2.7	7.3	2.5	7.3	2.5	11.8	22.6	18.2
17-Nov-87	1	1.547	143	24.1	3.3	9.8	3.3	9.8	3.3	15.8	29.4	16.5
18-Nov-87	0.7	1.083	144	34.2	4.3	14.1	4.5	14.1	4.3	22.6	39.0	18.8
19-Nov-87	0.6	0.928	142	39.2	4.8	16.2	5.2	16.2	4.8	26.0	43.5	19.0
20-Nov-87	0.6	0.928	136	37.6	4.7	15.6	5.0	15.6	4.7	25.1	42.1	22.4
21-Nov-87	0.7	1.083	138	32.9	4.2	13.6	4.4	13.6	4.2	21.8	37.8	23.9
22-Nov-87	0.4	0.619	140	57.6	6.7	23.9	7.6	23.9	6.7	38.4	60.0	27.8
23-Nov-87	0.6	0.928	140	38.7	4.8	16.0	5.1	16.0	4.8	25.7	43.0	27.8
24-Nov-87	0.7	1.083	143	34.0	4.3	14.0	4.5	14.0	4.3	22.5	38.8	27.1
25-Nov-87	0.9	1.392	140	26.1	3.5	10.7	3.5	10.7	3.5	17.3	31.7	26.0
26-Nov-87	0.7	1.083	132	31.5	4.0	13.1	4.3	13.1	4.0	21.1	36.5	21.6
27-Nov-87	0.7	1.083	137	32.6	4.2	13.5	4.4	13.5	4.2	21.7	37.6	20.6
28-Nov-87	0.5	0.774	141	46.6	5.6	19.3	6.2	19.3	5.6	31.0	50.1	22.8
29-Nov-87	0.5	0.774	140	46.2	5.5	19.2	6.1	19.2	5.5	30.8	49.8	26.1
30-Nov-87	0.6	0.928	137	37.9	4.7	15.7	5.1	15.7	4.7	25.3	42.3	27.2
01-Dec-87	0.8	1.238	147	30.7	4.0	12.5	4.1	12.5	4.0	20.1	35.8	26.8
02-Dec-87	1.1	1.702	143	22.0	3.1	9.0	3.0	9.0	3.0	14.4	27.0	22.7
03-Dec-87	1.7	2.630	177	17.8	2.7	6.9	2.4	6.9	2.4	11.2	21.6	17.8
04-Dec-87	3	4.642	145	8.8	1.8	3.5	1.5	3.5	1.5	5.7	13.2	12.9
05-Dec-87	1.6	2.476	125	13.6	2.3	5.6	2.0	5.6	2.0	9.1	18.2	10.1
06-Dec-87	1.3	2.011	157	20.5	3.0	8.2	2.8	8.2	2.8	13.2	24.9	9.8
07-Dec-87	1	1.547	126	21.4	3.0	8.9	3.0	8.9	3.0	14.3	26.8	10.6
08-Dec-87	0.9	1.392	139	26.0	3.5	10.7	3.5	10.7	3.5	17.2	31.6	13.4
09-Dec-87	1.1	1.702	341	51.1	6.0	17.8	5.7	17.8	5.7	28.6	51.6	18.3
10-Dec-87	4	6.189	3990	162.2	17.1	35.4	11.2	35.4	11.2	56.7	101.2	29.2
11-Dec-87	3.5	5.415	1990	92.9	10.2	23.1	7.4	23.1	7.4	37.1	66.5	34.9
12-Dec-87	1.6	2.476	1380	140.4	14.9	37.7	11.9	37.7	11.9	60.4	107.6	45.7
13-Dec-87	1.2	1.857	1120	151.8	16.1	42.4	13.5	42.4	13.5	68.0	121.2	55.8
14-Dec-87	1	1.547	981	159.5	16.9	45.8	14.5	45.8	14.5	73.3	130.6	59.7
15-Dec-87	1	1.547	405	66.4	7.5	22.5	7.2	22.5	7.2	36.1	64.7	59.4
16-Dec-87	1	1.547	177	29.6	3.9	11.6	3.8	11.6	3.8	18.7	34.3	49.0
17-Dec-87	0.8	1.238	239	49.3	5.8	18.4	5.9	18.4	5.8	29.6	52.5	39.4
18-Dec-87	0.7	1.083	216	50.9	6.0	19.4	6.2	19.4	6.0	31.2	54.0	28.9
19-Dec-87	0.9	1.392	120	22.5	3.2	9.5	3.1	9.5	3.1	15.3	28.4	23.7
20-Dec-87	0.7	1.083	131	31.2	4.0	13.0	4.2	13.0	4.0	21.0	36.3	24.2
21-Dec-87	1.2	1.857	184	25.8	3.5	10.0	3.3	10.0	3.3	16.1	29.9	20.9
22-Dec-87	1.2	1.857	150	21.2	3.0	8.5	2.9	8.5	2.9	13.8	25.9	16.5
23-Dec-87	1.1	1.702	130	20.1	2.9	8.3	2.8	8.3	2.8	13.4	25.2	16.1
24-Dec-87	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	15.4
25-Dec-87	1	1.547	131	22.2	3.1	9.2	3.1	9.2	3.1	14.8	27.6	15.1
26-Dec-87	0.8	1.238	130	27.3	3.6	11.4	3.7	11.4	3.6	18.3	32.7	16.2
27-Dec-87	0.8	1.238	126	26.4	3.5	11.1	3.6	11.1	3.5	17.8	32.0	17.3
28-Dec-87	0.8	1.238	126	26.4	3.5	11.1	3.6	11.1	3.5	17.8	32.0	17.2
29-Dec-87	0.8	1.238	126	26.4	3.5	11.1	3.6	11.1	3.5	17.8	32.0	17.9
30-Dec-87	0.9	1.392	122	22.9	3.2	9.6	3.2	9.6	3.2	15.5	28.8	17.2
31-Dec-87	0.8	1.238	125	26.2	3.5	11.0	3.6	11.0	3.5	17.7	31.8	17.2
01-Jan-88	0.5	0.774	127	42.0	5.1	17.7	5.7	17.7	5.1	28.5	46.0	19.9
02-Jan-88	0.9	1.392	125	23.4	3.2	9.8	3.2	9.8	3.2	15.8	29.3	19.4
03-Jan-88	0.9	1.392	130	24.3	3.3	10.1	3.3	10.1	3.3	16.3	30.1	19.6
04-Jan-88	0.5	0.774	137	45.3	5.4	18.8	6.0	18.8	5.4	30.3	48.9	22.7
05-Jan-88	0.6	0.928	134	37.1	4.6	15.5	5.0	15.5	4.6	24.8	41.6	21.8
06-Jan-88	0.8	1.238	134	28.1	3.7	11.6	3.8	11.6	3.7	18.7	33.5	22.5
07-Jan-88	0.7	1.083	134	31.9	4.1	13.3	4.3	13.3	4.1	21.3	36.9	23.8
08-Jan-88	0.6	0.928	137	37.9	4.7	15.7	5.1	15.7	4.7	25.3	42.3	22.5
09-Jan-88	1	1.547	142	23.9	3.3	9.8	3.2	9.8	3.2	15.7	29.2	20.3
10-Jan-88	0.8	1.238	149	31.1	4.0	12.7	4.1	12.7	4.0	20.3	36.2	20.7
11-Jan-88	0.8	1.238	144	30.1	3.9	12.3	4.0	12.3	3.9	19.8	35.3	20.3
12-Jan-88	0.7	1.083	142	33.8	4.3	13.9	4.5	13.9	4.3	22.3	38.6	19.6
13-Jan-88	1.1	1.702	153	23.5	3.2	9.4	3.1	9.4	3.1	15.2	28.3	19.4
14-Jan-88	1.5	2.321	324	35.9	4.5	12.6	4.1	12.6	4.1	20.3	37.0	19.4
15-Jan-88	4.8	7.427	980	34.0	4.3	9.6	3.2	9.6	3.2	15.5	28.8	18.3
16-Jan-88	2.5	3.868	196	13.7	2.3	5.2	1.9	5.2	1.9	8.4	17.1	14.8
17-Jan-88	1.5	2.321	178	20.2	2.9	7.9	2.7	7.9	2.7	12.7	24.0	14.2
18-Jan-88	1.2	1.857	154	21.7	3.1	8.7	2.9	8.7	2.9	14.0	26.3	12.6
19-Jan-88	1	1.547	137	23.1	3.2	9.5	3.2	9.5	3.2	15.3	28.5	12.6
20-Jan-88	0.9	1.392	139	26.0	3.5	10.7	3.5	10.7	3.5	17.2	31.6	14.8
21-Jan-88	1	1.547	133	22.5	3.1	9.3	3.1	9.3	3.1	15.0	27.9	15.4

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs):	River Discharge Rate at USGS 12100000 (cfs)	Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mg/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
				Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mg/L)	Acute (mg/L)	Chronic (mg/L)
22-Jan-88	0.9	1.392	140	26.1	3.5	10.7	3.5	10.7	3.5	17.3	31.7	16.2
23-Jan-88	1.3	2.011	145	19.0	2.8	7.7	2.6	7.7	2.6	12.4	23.6	15.4
24-Jan-88	1	1.547	138	23.3	3.2	9.6	3.2	9.6	3.2	15.4	28.6	15.0
25-Jan-88	0.9	1.392	135	25.2	3.4	10.4	3.4	10.4	3.4	16.8	30.9	15.5
26-Jan-88	0.9	1.392	135	25.2	3.4	10.4	3.4	10.4	3.4	16.8	30.9	15.3
27-Jan-88	0.8	1.238	139	29.1	3.8	12.0	3.9	12.0	3.8	19.3	34.4	17.0
28-Jan-88	0.9	1.392	145	27.0	3.6	11.0	3.6	11.0	3.6	17.7	32.5	17.6
29-Jan-88	2	3.094	162	14.1	2.3	5.5	2.0	5.5	2.0	9.0	18.0	15.7
30-Jan-88	2	3.094	130	11.5	2.1	4.7	1.8	4.7	1.8	7.6	15.9	13.4
31-Jan-88	1.3	2.011	131	17.3	2.6	7.1	2.4	7.1	2.4	11.5	22.1	11.4
01-Feb-88	1	1.547	135	22.8	3.2	9.4	3.1	9.4	3.1	15.1	28.2	10.8
02-Feb-88	0.9	1.392	139	26.0	3.5	10.7	3.5	10.7	3.5	17.2	31.6	12.8
03-Feb-88	0.8	1.238	140	29.3	3.8	12.0	3.9	12.0	3.8	19.4	34.5	15.8
04-Feb-88	0.8	1.238	138	28.9	3.8	11.9	3.9	11.9	3.8	19.1	34.2	17.7
05-Feb-88	0.9	1.392	138	25.8	3.5	10.6	3.5	10.6	3.5	17.1	31.4	18.2
06-Feb-88	1	1.547	137	23.1	3.2	9.5	3.2	9.5	3.2	15.3	28.5	17.7
07-Feb-88	0.9	1.392	178	33.0	4.2	13.0	4.2	13.0	4.2	20.9	37.9	18.1
08-Feb-88	1.1	1.702	283	42.6	5.2	15.4	5.0	15.4	5.0	24.7	44.7	19.5
09-Feb-88	1.2	1.857	729	99.2	10.8	30.1	9.6	30.1	9.6	48.2	86.1	27.3
10-Feb-88	1.6	2.476	1040	106.0	11.5	30.0	9.5	30.0	9.5	48.1	85.9	35.5
11-Feb-88	1.7	2.630	1710	163.5	17.3	42.1	13.3	42.1	13.3	67.5	120.2	47.1
12-Feb-88	1.4	2.166	1290	149.9	15.9	40.8	12.9	40.8	12.9	65.3	116.4	57.3
13-Feb-88	1.2	1.857	296	40.9	5.0	14.6	4.7	14.6	4.7	23.5	42.6	51.1
14-Feb-88	0.9	1.392	277	50.7	6.0	18.4	5.9	18.4	5.9	29.6	53.3	46.5
15-Feb-88	1.2	1.857	276	38.2	4.7	13.8	4.5	13.8	4.5	22.2	40.4	35.2
16-Feb-88	1.1	1.702	251	37.9	4.7	14.0	4.5	14.0	4.5	22.5	40.8	24.5
17-Feb-88	0.9	1.392	192	35.5	4.4	13.8	4.5	13.8	4.4	22.1	40.1	24.1
18-Feb-88	0.9	1.392	144	26.9	3.6	11.0	3.6	11.0	3.6	17.6	32.4	21.1
19-Feb-88	1	1.547	128	21.7	3.1	9.0	3.0	9.0	3.0	14.5	27.1	19.2
20-Feb-88	0.9	1.392	150	27.9	3.7	11.3	3.7	11.3	3.7	18.2	33.3	18.1
21-Feb-88	0.7	1.083	143	34.0	4.3	14.0	4.5	14.0	4.3	22.5	38.8	18.2
22-Feb-88	0.7	1.083	137	32.6	4.2	13.5	4.4	13.5	4.2	21.7	37.8	19.2
23-Feb-88	0.8	1.238	134	28.1	3.7	11.6	3.8	11.6	3.7	18.7	33.5	20.3
24-Feb-88	0.8	1.238	133	27.9	3.7	11.6	3.8	11.6	3.7	18.6	33.3	20.4
25-Feb-88	0.7	1.083	201	47.4	5.6	18.3	5.9	18.3	5.6	29.4	50.9	22.1
26-Feb-88	0.7	1.083	133	31.7	4.1	13.2	4.3	13.2	4.1	21.2	36.7	22.0
27-Feb-88	0.8	1.238	134	28.1	3.7	11.6	3.8	11.6	3.7	18.7	33.5	22.0
28-Feb-88	0.6	0.928	135	37.4	4.6	15.5	5.0	15.5	4.6	25.0	41.8	23.6
29-Feb-88	0.6	0.928	131	36.3	4.5	15.2	4.9	15.2	4.5	24.4	40.9	22.3
01-Mar-88	0.7	1.083	134	31.9	4.1	13.3	4.3	13.3	4.1	21.3	36.9	22.4
02-Mar-88	0.7	1.083	133	31.7	4.1	13.2	4.3	13.2	4.1	21.2	36.7	23.0
03-Mar-88	0.8	1.238	137	28.7	3.8	11.8	3.9	11.8	3.8	19.0	34.0	21.5
04-Mar-88	0.8	1.238	143	29.9	3.9	12.2	4.0	12.2	3.9	19.7	35.1	20.3
05-Mar-88	1.2	1.857	143	20.3	2.9	8.2	2.8	8.2	2.8	13.3	25.0	18.3
06-Mar-88	1	1.547	142	23.9	3.3	9.8	3.2	9.8	3.2	15.7	29.2	16.9
07-Mar-88	0.8	1.238	140	29.3	3.8	12.0	3.9	12.0	3.8	19.4	34.5	17.0
08-Mar-88	0.9	1.392	186	34.4	4.3	13.4	4.4	13.4	4.3	21.6	39.2	17.5
09-Mar-88	2.4	3.713	476	33.0	4.2	10.8	3.5	10.8	3.5	17.3	31.9	18.5
10-Mar-88	2.3	3.559	248	18.4	2.7	6.7	2.3	6.7	2.3	10.8	21.0	17.3
11-Mar-88	1.8	2.785	171	16.4	2.5	6.4	2.2	6.4	2.2	10.3	20.2	15.0
12-Mar-88	1.4	2.166	161	19.6	2.9	7.8	2.6	7.8	2.6	12.5	23.8	12.7
13-Mar-88	1.1	1.702	153	23.5	3.2	9.4	3.1	9.4	3.1	15.2	28.3	12.2
14-Mar-88	0.9	1.392	150	27.9	3.7	11.3	3.7	11.3	3.7	18.2	33.3	14.1
15-Mar-88	0.9	1.392	145	27.0	3.6	11.0	3.6	11.0	3.6	17.7	32.5	15.9
16-Mar-88	0.8	1.238	144	30.1	3.9	12.3	4.0	12.3	3.9	19.8	35.3	17.7
17-Mar-88	0.8	1.238	144	30.1	3.9	12.3	4.0	12.3	3.9	19.8	35.3	18.9
18-Mar-88	0.8	1.238	144	30.1	3.9	12.3	4.0	12.3	3.9	19.8	35.3	19.3
19-Mar-88	1	1.547	142	23.9	3.3	9.8	3.2	9.8	3.2	15.7	29.2	18.8
20-Mar-88	0.7	1.083	141	33.5	4.3	13.8	4.5	13.8	4.3	22.2	38.4	19.4
21-Mar-88	1	1.547	144	24.3	3.3	9.9	3.3	9.9	3.3	15.9	29.5	18.4
22-Mar-88	1.1	1.702	149	22.9	3.2	9.2	3.1	9.2	3.1	14.9	27.8	17.2
23-Mar-88	1.8	2.785	171	16.4	2.5	6.4	2.2	6.4	2.2	10.3	20.2	15.8
24-Mar-88	1.8	2.785	168	16.1	2.5	6.3	2.2	6.3	2.2	10.2	19.9	12.8
25-Mar-88	2.8	4.332	192	12.1	2.1	4.6	1.7	4.6	1.7	7.4	15.7	10.7
26-Mar-88	3.5	5.415	934	44.1	5.3	12.6	4.1	12.6	4.1	20.3	37.1	12.1
27-Mar-88	4.8	7.427	1020	35.3	4.4	9.9	3.3	9.9	3.3	16.0	29.6	13.5
28-Mar-88	2.4	3.713	429	29.9	3.9	9.9	3.3	9.9	3.3	15.9	29.5	14.9
29-Mar-88	2.6	4.023	228	15.2	2.4	5.6	2.0	5.6	2.0	9.1	18.2	15.3
30-Mar-88	2.3	3.559	203	15.3	2.4	5.8	2.1	5.8	2.1	9.3	18.6	12.6
31-Mar-88	1.7	2.630	194	19.4	2.8	7.4	2.5	7.4	2.5	12.0	22.9	11.6
01-Apr-88	1.4	2.166	189	22.8	3.2	8.8	2.9	8.8	2.9	14.2	26.6	11.1
02-Apr-88	1.6	2.476	327	34.0	4.3	11.9	3.9	11.9	3.9	19.2	35.1	13.7
03-Apr-88	2.9	4.487	1270	71.8	8.1	19.5	6.2	19.5	6.2	31.3	56.2	19.2
04-Apr-88	3.3	5.106	1080	53.9	6.3	15.1	4.9	15.1	4.9	24.2	43.8	22.2
05-Apr-88	2.4	3.713	780	53.5	6.3	15.9	5.1	15.9	5.1	25.6	46.2	25.0
06-Apr-88	2.5	3.868	1680	109.6	11.9	28.3	9.0	28.3	9.0	45.3	81.0	31.6
07-Apr-88	4.3	6.653	2190	83.3	9.2	20.4	6.5	20.4	6.5	32.7	58.7	31.9
08-Apr-88	2.8	4.332	1460	85.3	9.4	22.6	7.2	22.6	7.2	36.2	64.9	34.9
09-Apr-88	1.9	2.940	1130	97.1	10.6	27.0	8.6	27.0	8.6	43.3	77.5	39.4
10-Apr-88	1.5	2.321	693	75.7	8.5	23.1	7.4	23.1	7.4	37.1	66.4	37.3
11-Apr-88	1.2	1.857	421	57.7	6.7	19.4	6.2	19.4	6.2	31.1	55.9	36.9
12-Apr-88	1.1	1.702	464	69.2	7.8	22.8	7.3	22.8	7.3	36.6	65.6	37.0
13-Apr-88	1.1	1.702	1400	206.7	21.6	55.4	17.5	55.4	17.5	88.7	157.9	48.4

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation.)

				Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox, 1995; Fischer et al., 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mg/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs):	River Discharge Rate at USGS 12100000 (cfs)	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mg/L)	Acute (mg/L)	Chronic (mg/L)
14-Apr-88	1	1.547	1500	243.4	25.2	64.4	20.4	64.4	20.4	103.1	183.5	84.9
15-Apr-88	1.1	1.702	1320	194.9	20.4	52.8	16.7	52.8	16.7	84.6	150.7	78.3
16-Apr-88	1	1.547	1230	199.7	20.9	54.9	17.4	54.9	17.4	87.9	156.5	91.1
17-Apr-88	1	1.547	1160	188.4	19.7	52.4	16.6	52.4	16.6	83.9	149.4	89.9
18-Apr-88	0.9	1.392	1070	193.1	20.2	54.5	17.3	54.5	17.3	87.3	155.5	85.9
19-Apr-88	0.9	1.392	801	144.8	15.4	43.2	13.7	43.2	13.7	69.2	123.3	82.1
20-Apr-88	1	1.547	515	84.2	9.3	27.3	8.7	27.3	8.7	43.8	78.2	71.0
21-Apr-88	0.8	1.238	399	81.6	9.1	27.8	8.8	27.8	8.8	44.5	79.6	61.2
22-Apr-88	0.9	1.392	400	72.8	8.2	24.7	7.9	24.7	7.9	39.7	71.1	49.3
23-Apr-88	0.7	1.083	366	85.5	9.4	29.6	9.4	29.6	9.4	47.5	84.8	43.9
24-Apr-88	0.8	1.238	350	71.7	8.1	25.0	8.0	25.0	8.0	40.1	71.8	43.0
25-Apr-88	1.1	1.702	348	52.1	6.1	18.1	5.8	18.1	5.8	29.1	52.4	39.1
26-Apr-88	1.3	2.011	296	37.8	4.7	13.5	4.4	13.5	4.4	21.7	39.5	34.6
27-Apr-88	0.9	1.392	231	42.5	5.1	16.0	5.1	16.0	5.1	25.6	46.3	29.1
28-Apr-88	0.9	1.392	229	42.1	5.1	15.8	5.1	15.8	5.1	25.5	46.0	25.5
29-Apr-88	1.3	2.011	387	49.1	5.8	16.7	5.4	16.7	5.4	26.9	48.5	24.9
30-Apr-88	1.6	2.476	246	25.8	3.5	9.5	3.2	9.5	3.2	15.3	28.5	23.3
01-Nov-88	1	1.547	150	25.2	3.4	10.2	3.4	10.2	3.4	16.4	30.4	
02-Nov-88	1.6	2.476	156	16.8	2.6	6.7	2.3	6.7	2.3	10.8	20.9	
03-Nov-88	2.6	4.023	506	32.4	4.1	10.4	3.4	10.4	3.4	16.8	31.0	
04-Nov-88	2	3.094	1000	81.8	9.1	23.3	7.4	23.3	7.4	37.4	66.9	20.3
05-Nov-88	3.8	5.879	1230	53.3	8.2	14.5	4.7	14.5	4.7	23.3	42.3	22.1
06-Nov-88	2.1	3.249	2690	208.0	21.7	49.1	15.5	49.1	15.5	78.6	140.0	39.0
07-Nov-88	1.7	2.630	1670	159.7	16.9	41.3	13.1	41.3	13.1	66.2	118.0	51.4
08-Nov-88	1.7	2.630	1130	108.4	11.7	30.2	9.6	30.2	9.6	48.4	86.5	54.1
09-Nov-88	1.8	2.785	696	63.5	7.2	19.3	6.2	19.3	6.2	31.1	55.8	56.1
10-Nov-88	2.3	3.559	723	51.8	6.1	15.6	5.0	15.6	5.0	25.1	45.4	42.7
11-Nov-88	1.9	2.940	741	64.0	7.3	19.3	6.2	19.3	6.2	30.9	55.6	33.9
12-Nov-88	1.6	2.476	772	79.0	8.8	23.6	7.5	23.6	7.5	37.9	67.9	31.3
13-Nov-88	1.8	2.785	732	66.7	7.6	20.1	6.4	20.1	6.4	32.3	58.1	31.6
14-Nov-88	1.6	2.476	584	60.0	6.9	18.9	6.1	18.9	6.1	30.3	54.6	32.9
15-Nov-88	1.2	1.857	506	69.1	7.8	22.4	7.2	22.4	7.2	36.0	64.5	34.1
16-Nov-88	2.8	4.332	349	21.1	3.0	7.2	2.5	7.2	2.5	11.7	22.4	27.6
17-Nov-88	3.3	5.106	340	17.6	2.7	6.1	2.1	6.1	2.1	9.8	19.3	22.0
18-Nov-88	1.7	2.630	232	23.1	3.2	8.6	2.9	8.6	2.9	13.8	25.9	17.8
19-Nov-88	1.7	2.630	205	20.5	2.9	7.8	2.6	7.8	2.6	12.5	23.8	11.9
20-Nov-88	1.8	2.785	217	20.5	2.9	7.7	2.6	7.7	2.6	12.4	23.6	12.1
21-Nov-88	2.7	4.177	233	14.9	2.4	5.5	2.0	5.5	2.0	8.9	17.9	11.9
22-Nov-88	4.2	6.498	549	22.1	3.1	7.0	2.4	7.0	2.4	11.2	21.7	11.3
23-Nov-88	2.7	4.177	1580	95.6	10.5	24.9	7.9	24.9	7.9	40.0	71.5	18.1
24-Nov-88	1.8	2.785	1010	91.7	10.1	26.1	8.3	26.1	8.3	41.8	74.8	25.5
25-Nov-88	1.7	2.630	664	63.2	7.2	19.5	6.2	19.5	6.2	31.3	56.2	31.1
26-Nov-88	1.3	2.011	472	59.7	6.9	19.6	6.3	19.6	6.3	31.5	56.5	36.1
27-Nov-88	1.9	2.940	482	42.0	5.1	13.7	4.4	13.7	4.4	22.0	39.9	31.6
28-Nov-88	1.3	2.011	750	94.2	10.3	28.4	9.0	28.4	9.0	45.5	81.4	32.6
29-Nov-88	1.3	2.011	712	89.5	9.8	27.2	8.7	27.2	8.7	43.7	78.1	35.7
30-Nov-88	1.1	1.702	745	110.4	11.9	33.4	10.6	33.4	10.6	53.5	95.4	41.2
01-Dec-88	1.1	1.702	230	34.8	4.4	13.0	4.2	13.0	4.2	21.0	38.2	40.9
02-Dec-88	1.1	1.702	228	34.5	4.3	12.9	4.2	12.9	4.2	20.8	37.9	34.7
03-Dec-88	0.8	1.238	164	34.1	4.3	13.7	4.4	13.7	4.3	21.9	38.9	29.3
04-Dec-88	0.6	0.928	159	43.8	5.3	17.7	5.7	17.7	5.3	28.4	47.6	23.0
05-Dec-88	1.1	1.702	340	50.9	6.0	17.8	5.7	17.8	5.7	28.6	51.5	24.9
06-Dec-88	1.1	1.702	1240	183.1	19.2	50.2	15.9	50.2	15.9	80.5	143.3	39.9
07-Dec-88	1.1	1.702	1340	197.8	20.7	53.5	16.9	53.5	16.9	85.6	152.5	55.8
08-Dec-88	1.1	1.702	548	81.5	9.0	26.1	8.3	26.1	8.3	41.8	74.8	59.1
09-Dec-88	1.1	1.702	336	50.4	5.9	17.6	5.7	17.6	5.7	28.3	51.0	59.1
10-Dec-88	0.9	1.392	308	56.3	6.5	20.1	6.4	20.1	6.4	32.2	57.9	47.0
11-Dec-88	1.1	1.702	229	34.6	4.4	13.0	4.2	13.0	4.2	20.9	38.1	30.8
12-Dec-88	1.5	2.321	226	25.3	3.4	9.5	3.1	9.5	3.1	15.3	28.4	24.2
13-Dec-88	1.5	2.321	473	52.0	6.1	17.0	5.5	17.0	5.5	27.3	49.3	23.9
14-Dec-88	1.3	2.011	677	85.1	9.4	26.2	8.3	26.2	8.3	42.0	75.0	26.4
15-Dec-88	1.4	2.166	346	40.9	5.0	14.2	4.6	14.2	4.6	22.8	41.4	26.9
16-Dec-88	1	1.547	225	37.4	4.6	14.1	4.6	14.1	4.6	22.6	41.1	28.7
17-Dec-88	1	1.547	183	30.6	4.0	11.9	3.9	11.9	3.9	19.2	35.2	26.7
18-Dec-88	1.4	2.166	173	21.0	3.0	8.2	2.8	8.2	2.8	13.2	25.0	19.5
19-Dec-88	1.6	2.476	179	19.1	2.8	7.4	2.5	7.4	2.5	12.0	22.9	16.8
20-Dec-88	1.4	2.166	185	22.4	3.1	8.7	2.9	8.7	2.9	14.0	26.2	14.6
21-Dec-88	1.2	1.857	182	25.5	3.5	9.9	3.3	9.9	3.3	16.0	29.7	13.8
22-Dec-88	1.3	2.011	176	22.9	3.2	9.0	3.0	9.0	3.0	14.4	27.0	14.1
23-Dec-88	1.2	1.857	173	24.3	3.3	9.6	3.2	9.6	3.2	15.4	28.6	14.9
24-Dec-88	1.1	1.702	171	26.1	3.5	10.3	3.4	10.3	3.4	16.6	30.7	15.6
25-Dec-88	1	1.547	167	28.0	3.7	11.1	3.8	11.1	3.8	17.9	32.9	16.1
26-Dec-88	1.1	1.702	164	25.1	3.4	10.0	3.3	10.0	3.3	16.1	29.7	16.5
27-Dec-88	1	1.547	166	27.8	3.7	11.1	3.6	11.1	3.6	17.8	32.7	17.1
28-Dec-88	1	1.547	161	27.0	3.6	10.8	3.5	10.8	3.5	17.4	32.0	17.3
29-Dec-88	3.4	5.260	168	9.0	1.8	3.5	1.5	3.5	1.5	5.7	13.2	14.2
30-Dec-88	2.7	4.177	452	28.1	3.7	9.2	3.1	9.2	3.1	14.8	27.6	13.9
31-Dec-88	2.2	3.404	580	43.6	5.3	13.7	4.4	13.7	4.4	22.0	40.0	15.0
01-Jan-89	1.8	2.785	352	32.6	4.2	11.2	3.7	11.2	3.7	18.1	33.2	15.1
02-Jan-89	2	3.094	288	24.1	3.3	8.6	2.9	8.6	2.9	13.9	26.0	17.2
03-Jan-89	2.3	3.559	273	20.2	2.9	7.2	2.5	7.2	2.5	11.7	22.4	16.4
04-Jan-89	2.4	3.713	561	38.8	4.8	12.2	4.0	12.2	4.0	19.7	36.0	15.8

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation.)

				Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox, 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mg/N/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs)	River Discharge Rate at USGS 12100000 (cfs)	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mg/N/L)	Acute (mg/N/L)	Chronic (mg/N/L)
05-Jan-89	3	4.642	759	41.9	5.1	12.5	4.1	12.5	4.1	20.1	36.7	16.3
06-Jan-89	2.4	3.713	550	38.0	4.7	12.1	3.9	12.1	3.9	19.4	35.5	17.7
07-Jan-89	1.8	2.785	367	33.9	4.3	11.6	3.8	11.6	3.8	18.7	34.2	19.5
08-Jan-89	3.1	4.796	314	17.4	2.6	6.0	2.1	6.0	2.1	9.8	19.3	17.0
09-Jan-89	3.6	5.570	564	26.3	3.5	8.3	2.8	8.3	2.8	13.3	25.1	15.3
10-Jan-89	2.3	3.559	1010	72.0	8.1	20.4	6.5	20.4	6.5	32.8	58.8	18.6
11-Jan-89	1.8	2.785	534	48.9	5.8	15.7	5.0	15.7	5.0	25.2	45.5	20.3
12-Jan-89	1.8	2.785	325	30.2	3.9	10.6	3.5	10.6	3.5	17.0	31.3	22.1
13-Jan-89	2	3.094	304	25.6	3.5	9.0	3.0	9.0	3.0	14.5	27.2	22.4
14-Jan-89	1.8	2.785	279	26.0	3.5	9.4	3.1	9.4	3.1	15.1	28.1	17.9
15-Jan-89	1.9	2.940	258	22.9	3.2	8.3	2.8	8.3	2.8	13.4	25.3	15.0
16-Jan-89	2.4	3.713	313	22.1	3.1	7.7	2.6	7.7	2.6	12.5	23.7	13.9
17-Jan-89	1.9	2.940	629	54.5	6.3	16.9	5.4	16.9	5.4	27.2	49.0	17.0
18-Jan-89	2.3	3.559	977	69.6	7.9	19.9	6.4	19.9	6.4	31.9	57.3	21.2
19-Jan-89	1.8	2.785	1710	154.5	16.4	39.8	12.6	39.8	12.6	63.7	113.8	33.8
20-Jan-89	1.9	2.940	1950	166.8	17.6	41.9	13.3	41.9	13.3	67.1	119.6	47.5
21-Jan-89	1.7	2.630	1750	167.3	17.6	42.9	13.6	42.9	13.6	68.7	122.5	57.9
22-Jan-89	1.7	2.630	1570	150.2	15.9	39.3	12.5	39.3	12.5	63.0	112.3	65.6
23-Jan-89	1.6	2.478	1360	138.3	14.7	37.2	11.8	37.2	11.8	59.6	106.4	64.6
24-Jan-89	1.4	2.166	1240	144.1	15.3	39.5	12.5	39.5	12.5	63.3	112.8	63.7
25-Jan-89	1.4	2.166	1160	134.9	14.4	37.4	11.9	37.4	11.9	60.0	107.0	61.5
26-Jan-89	1.5	2.321	1090	118.4	12.7	33.2	10.6	33.2	10.6	53.3	95.1	59.0
27-Jan-89	1.5	2.321	1110	120.6	13.0	33.7	10.7	33.7	10.7	54.1	96.5	57.6
28-Jan-89	1.3	2.011	1040	130.3	13.9	36.9	11.7	36.9	11.7	59.2	105.5	56.6
29-Jan-89	1.2	1.857	1030	139.7	14.9	39.7	12.6	39.7	12.6	63.8	113.3	57.5
30-Jan-89	1.9	2.940	1560	133.7	14.3	35.0	11.1	35.0	11.1	56.1	100.1	58.2
31-Jan-89	1.8	2.785	2340	211.1	22.0	51.2	16.2	51.2	16.2	82.0	146.0	65.2
01-Feb-89	1.7	2.630	2260	215.8	22.5	52.7	16.7	52.7	16.7	84.4	150.3	71.5
02-Feb-89	1.8	2.785	1470	133.0	14.2	35.2	11.2	35.2	11.2	56.5	100.7	69.7
03-Feb-89	1.7	2.630	1200	115.1	12.4	31.7	10.1	31.7	10.1	50.8	90.7	68.4
04-Feb-89	1.6	2.476	1140	116.1	12.5	32.3	10.3	32.3	10.3	51.8	92.4	60.9
05-Feb-89	1.4	2.166	1090	126.8	13.6	35.6	11.3	35.6	11.3	57.1	101.8	54.0
06-Feb-89	1.6	2.476	1060	108.0	11.7	30.5	9.7	30.5	9.7	48.9	87.2	52.1
07-Feb-89	1	1.547	998	162.3	17.1	46.4	14.7	46.4	14.7	74.3	132.4	58.0
08-Feb-89	1.1	1.702	902	133.5	14.2	38.9	12.3	38.9	12.3	62.3	111.1	60.6
09-Feb-89	1.2	1.857	854	116.0	12.5	34.1	10.8	34.1	10.8	54.7	97.6	60.1
10-Feb-89	1	1.547	825	134.3	14.3	39.8	12.6	39.8	12.6	63.8	113.8	63.8
11-Feb-89	0.7	1.083	800	185.7	19.5	55.5	17.6	55.5	17.6	88.8	158.2	67.4
12-Feb-89	1	1.547	783	127.5	13.7	38.2	12.1	38.2	12.1	61.2	109.1	67.1
13-Feb-89	0.9	1.392	711	128.8	13.8	39.3	12.5	39.3	12.5	62.9	112.2	69.2
14-Feb-89	0.9	1.392	635	115.0	12.4	35.9	11.4	35.9	11.4	57.5	102.5	67.6
15-Feb-89	1	1.547	694	113.1	12.2	34.7	11.0	34.7	11.0	55.6	99.1	59.3
16-Feb-89	1.3	2.011	697	87.6	9.7	26.8	8.5	26.8	8.5	42.9	76.8	54.7
17-Feb-89	1.7	2.630	725	89.9	7.9	21.2	6.8	21.2	6.8	34.0	60.9	47.5
18-Feb-89	1.8	2.785	757	69.0	7.8	20.7	6.6	20.7	6.6	33.2	59.6	41.4
19-Feb-89	1.8	2.785	761	69.3	7.8	20.8	6.6	20.8	6.6	33.3	59.8	35.9
20-Feb-89	1.8	2.785	763	69.5	7.8	20.8	6.7	20.8	6.7	33.4	60.0	33.5
21-Feb-89	1.6	2.476	776	79.4	8.8	23.7	7.6	23.7	7.6	38.1	68.2	34.5
22-Feb-89	1.9	2.940	821	70.8	8.0	20.9	6.7	20.9	6.7	33.6	60.3	34.6
23-Feb-89	1.7	2.630	917	88.2	9.7	25.5	8.1	25.5	8.1	41.0	73.3	36.5
24-Feb-89	1.5	2.321	889	96.8	10.6	28.2	9.0	28.2	9.0	45.3	80.9	39.5
25-Feb-89	1.8	2.785	851	77.4	8.6	22.7	7.2	22.7	7.2	36.5	65.3	39.1
26-Feb-89	1.6	2.476	838	85.6	9.5	25.2	8.0	25.2	8.0	40.5	72.4	40.8
27-Feb-89	1.5	2.321	804	87.6	9.7	26.0	8.3	26.0	8.3	41.8	74.7	41.0
28-Feb-89	1.4	2.166	796	92.9	10.2	27.7	8.8	27.7	8.8	44.4	79.3	40.8
01-Mar-89	1.6	2.476	788	80.6	9.0	24.0	7.7	24.0	7.7	38.5	68.9	41.3
02-Mar-89	1.7	2.630	771	74.3	8.3	22.2	7.1	22.2	7.1	35.7	63.9	40.1
03-Mar-89	1.6	2.476	723	74.0	8.3	22.4	7.2	22.4	7.2	36.0	64.5	38.6
04-Mar-89	1.6	2.476	694	71.1	8.0	21.7	6.9	21.7	6.9	34.8	62.4	38.2
05-Mar-89	3.1	4.796	714	38.2	4.7	11.5	3.8	11.5	3.8	18.5	34.0	31.2
06-Mar-89	2.8	4.332	1100	64.5	7.3	18.0	5.8	18.0	5.8	28.9	52.0	29.5
07-Mar-89	2.2	3.404	1310	97.2	10.6	26.3	8.4	26.3	8.4	42.2	75.4	31.1
08-Mar-89	1.7	2.630	1130	108.4	11.7	30.2	9.6	30.2	9.6	48.4	86.5	34.5
09-Mar-89	1.6	2.476	1060	108.0	11.7	30.5	9.7	30.5	9.7	48.9	87.2	42.1
10-Mar-89	1.7	2.630	1230	117.9	12.7	32.3	10.3	32.3	10.3	51.8	92.5	47.8
11-Mar-89	1.9	2.940	1500	128.6	13.8	33.9	10.8	33.9	10.8	54.4	97.0	50.9
12-Mar-89	2.7	4.177	1940	117.1	12.6	29.4	9.3	29.4	9.3	47.1	84.1	50.5
13-Mar-89	2.5	3.868	1960	127.7	13.7	32.0	10.2	32.0	10.2	51.3	91.5	51.1
14-Mar-89	2.1	3.249	1720	133.3	14.2	34.3	10.9	34.3	10.9	54.9	98.0	51.9
15-Mar-89	2.1	3.249	1510	117.2	12.6	30.9	9.8	30.9	9.8	49.5	88.3	50.7
16-Mar-89	3.3	5.106	1480	73.5	8.2	19.4	6.2	19.4	6.2	31.1	55.9	46.7
17-Mar-89	2.1	3.249	1210	94.1	10.3	25.8	8.2	25.8	8.2	41.4	74.1	44.2
18-Mar-89	2.1	3.249	1040	81.0	9.0	22.9	7.3	22.9	7.3	36.7	65.8	39.7
19-Mar-89	1.8	2.785	1010	91.7	10.1	26.1	8.3	26.1	8.3	41.8	74.8	37.8
20-Mar-89	2	3.094	1020	83.4	9.2	23.7	7.5	23.7	7.5	37.9	68.0	39.5
21-Mar-89	1.9	2.940	865	74.6	8.4	21.8	7.0	21.8	7.0	35.0	62.8	37.9
22-Mar-89	1.5	2.321	725	79.1	8.8	24.0	7.6	24.0	7.6	38.4	68.8	38.3
23-Mar-89	1.1	1.702	518	77.1	8.6	24.9	7.9	24.9	7.9	40.0	71.8	37.8
24-Mar-89	1.4	2.166	406	47.9	5.7	16.1	5.2	16.1	5.2	25.9	46.8	34.8
25-Mar-89	2	3.094	565	45.8	5.5	14.5	4.7	14.5	4.7	23.4	42.4	31.9
26-Mar-89	1.6	2.476	659	67.6	7.7	20.8	6.7	20.8	6.7	33.4	60.0	30.7
27-Mar-89	2.4	3.713	639	44.0	5.3	13.6	4.4	13.6	4.4	21.8	39.7	26.1
28-Mar-89	2.4	3.713	503	34.9	4.4	11.2	3.7	11.2	3.7	18.1	33.2	24.2

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

				Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs)	River Discharge Rate at USGS 12100000 (cfs)	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
29-Mar-89	1.8	2.785	476	43.7	5.3	14.3	4.6	14.3	4.6	23.0	41.6	24.1
30-Mar-89	1.8	2.785	567	51.9	6.1	16.4	5.3	16.4	5.3	26.4	47.6	22.3
31-Mar-89	1.7	2.630	867	83.4	9.2	24.4	7.8	24.4	7.8	39.2	70.1	26.6
01-Apr-89	2	3.094	667	54.9	6.4	16.8	5.4	16.8	5.4	27.0	48.8	28.9
02-Apr-89	2.4	3.713	539	37.3	4.6	11.9	3.9	11.9	3.9	19.1	34.9	27.9
03-Apr-89	2.1	3.249	384	30.5	4.0	10.3	3.4	10.3	3.4	16.7	30.8	25.5
04-Apr-89	2.7	4.177	385	24.0	3.3	8.1	2.7	8.1	2.7	13.1	24.7	19.0
05-Apr-89	3.6	5.570	1070	49.0	5.8	13.7	4.4	13.7	4.4	22.0	40.0	17.7
06-Apr-89	2.4	3.713	2270	153.8	16.3	37.5	11.9	37.5	11.9	60.1	107.1	27.9
07-Apr-89	1.8	2.785	2990	269.4	27.8	62.3	19.7	62.3	19.7	99.8	177.7	48.7
08-Apr-89	1.4	2.166	2170	251.5	26.0	61.9	19.6	61.9	19.6	99.1	176.5	70.3
09-Apr-89	1.2	1.857	1730	233.9	24.3	60.2	19.1	60.2	19.1	96.4	171.6	88.8
10-Apr-89	1.2	1.857	1500	203.0	21.2	53.7	17.0	53.7	17.0	86.0	153.1	95.3
11-Apr-89	1	1.547	1290	209.4	21.8	57.0	18.1	57.0	18.1	91.3	162.6	93.2
12-Apr-89	1	1.547	1250	203.0	21.2	55.6	17.6	55.6	17.6	89.1	158.6	90.7
13-Apr-89	1	1.547	1230	199.7	20.9	54.9	17.4	54.9	17.4	87.9	156.5	88.6
14-Apr-89	1	1.547	1410	228.8	23.8	61.3	19.4	61.3	19.4	98.1	174.6	91.6
15-Apr-89	0.9	1.392	1620	291.8	30.1	76.1	24.1	76.1	24.1	121.8	216.8	99.2
16-Apr-89	0.9	1.392	1730	311.6	32.1	80.2	25.4	80.2	25.4	128.5	228.6	109.1
17-Apr-89	0.9	1.392	1670	300.8	31.0	78.0	24.7	78.0	24.7	124.9	222.2	118.3
18-Apr-89	0.9	1.392	1520	273.9	28.3	72.3	22.9	72.3	22.9	115.8	206.0	122.7
19-Apr-89	0.8	1.238	1380	279.7	28.9	75.2	23.8	75.2	23.8	120.5	214.4	122.4
20-Apr-89	1	1.547	1430	232.1	24.1	62.0	19.6	62.0	19.6	99.2	176.6	115.1
21-Apr-89	0.9	1.392	1560	281.1	29.0	73.8	23.4	73.8	23.4	118.2	210.4	113.4
22-Apr-89	0.8	1.238	1490	301.9	31.1	80.0	25.3	80.0	25.3	128.1	228.0	116.5
23-Apr-89	0.9	1.392	1280	230.8	24.0	63.0	19.9	63.0	19.9	100.8	179.5	111.6
24-Apr-89	0.9	1.392	928	167.6	17.7	48.6	15.4	48.6	15.4	77.9	138.7	108.3
25-Apr-89	0.9	1.392	488	88.6	9.8	29.0	9.2	29.0	9.2	46.5	83.1	88.4
26-Apr-89	0.9	1.392	287	52.5	6.2	19.0	6.1	19.0	6.1	30.5	54.8	63.9
27-Apr-89	0.8	1.238	219	45.2	5.4	17.2	5.5	17.2	5.4	27.6	48.9	45.6
28-Apr-89	0.8	1.238	217	44.8	5.4	17.1	5.5	17.1	5.4	27.4	48.5	33.0
29-Apr-89	0.6	0.928	205	56.5	6.5	21.8	7.0	21.8	6.5	35.0	59.0	30.1
30-Apr-89	0.7	1.083	209	49.2	5.8	18.9	6.1	18.9	5.8	30.4	52.5	30.1
01-Nov-89	0.6	0.928	125	34.7	4.4	14.6	4.7	14.6	4.4	23.5	39.4	
02-Nov-89	0.6	0.928	129	35.7	4.5	15.0	4.8	15.0	4.5	24.1	40.4	
03-Nov-89	0.8	1.238	127	26.7	3.6	11.1	3.7	11.1	3.6	17.9	32.2	
04-Nov-89	0.8	1.238	135	28.3	3.7	11.7	3.8	11.7	3.7	18.8	33.6	21.1
05-Nov-89	0.7	1.083	128	30.5	4.0	12.8	4.2	12.8	4.0	20.6	35.7	20.4
06-Nov-89	0.8	1.238	127	26.7	3.6	11.1	3.7	11.1	3.6	17.9	32.2	18.8
07-Nov-89	0.7	1.083	123	29.4	3.8	12.4	4.0	12.4	3.8	19.9	34.7	19.3
08-Nov-89	0.9	1.392	124	23.3	3.2	9.7	3.2	9.7	3.2	15.7	29.1	18.5
09-Nov-89	1.1	1.702	1550	228.7	23.8	60.1	19.0	60.1	19.0	96.3	171.4	37.5
10-Nov-89	1.8	2.785	1450	131.2	14.0	34.8	11.1	34.8	11.1	55.8	99.6	46.9
11-Nov-89	3.6	5.570	1540	70.1	7.9	18.3	5.9	18.3	5.9	29.4	53.0	49.3
12-Nov-89	2.4	3.713	2200	149.1	15.6	36.5	11.6	36.5	11.6	58.6	104.4	60.0
13-Nov-89	1.5	2.321	1180	128.1	13.7	35.4	11.2	35.4	11.2	56.8	101.3	50.2
14-Nov-89	1	1.547	956	155.5	16.4	44.8	14.2	44.8	14.2	71.8	128.0	54.1
15-Nov-89	0.9	1.392	276	50.6	6.0	18.4	5.9	18.4	5.9	29.5	53.1	54.2
16-Nov-89	1.5	2.321	169	19.2	2.8	7.5	2.6	7.5	2.6	12.2	23.2	42.6
17-Nov-89	1.2	1.857	486	66.4	7.5	21.7	6.9	21.7	6.9	34.9	62.5	37.1
18-Nov-89	1	1.547	210	34.9	4.4	13.3	4.3	13.3	4.3	21.4	39.0	24.5
19-Nov-89	1	1.547	153	25.7	3.5	10.4	3.4	10.4	3.4	16.7	30.8	21.3
20-Nov-89	1	1.547	140	23.6	3.3	9.7	3.2	9.7	3.2	15.8	28.9	22.1
21-Nov-89	0.9	1.392	130	24.3	3.3	10.1	3.3	10.1	3.3	16.3	30.1	17.5
22-Nov-89	1	1.547	122	20.7	3.0	8.7	2.9	8.7	2.9	14.0	26.2	15.6
23-Nov-89	1.5	2.321	132	15.2	2.4	6.2	2.2	6.2	2.2	10.1	19.8	14.0
24-Nov-89	1.7	2.630	149	15.2	2.4	6.1	2.1	6.1	2.1	9.8	19.4	12.5
25-Nov-89	1.5	2.321	651	71.1	8.0	22.0	7.0	22.0	7.0	35.3	63.2	17.3
26-Nov-89	1.4	2.166	694	81.1	9.0	24.8	7.9	24.8	7.9	39.8	71.2	23.7
27-Nov-89	1	1.547	137	23.1	3.2	9.5	3.2	9.5	3.2	15.3	28.5	25.0
28-Nov-89	1	1.547	120	20.4	2.9	8.6	2.9	8.6	2.9	13.8	25.9	26.0
29-Nov-89	0.9	1.392	121	22.7	3.2	9.6	3.2	9.6	3.2	15.4	28.6	21.1
30-Nov-89	0.9	1.392	120	22.5	3.2	9.5	3.1	9.5	3.1	15.3	28.4	15.0
01-Dec-89	0.9	1.392	133	24.9	3.4	10.3	3.4	10.3	3.4	16.6	30.6	15.3
02-Dec-89	1.1	1.702	125	19.4	2.8	8.1	2.7	8.1	2.7	13.0	24.6	15.1
03-Dec-89	2.9	4.487	174	10.7	2.0	4.1	1.6	4.1	1.6	6.7	14.6	12.9
04-Dec-89	5.4	8.355	3150	95.3	10.4	21.7	6.9	21.7	6.9	34.8	62.5	17.8
05-Dec-89	2.5	3.868	5740	372.0	38.1	75.8	24.0	75.8	24.0	121.4	216.1	44.0
06-Dec-89	1.7	2.630	2870	273.8	28.3	63.8	20.2	63.8	20.2	102.2	182.0	66.3
07-Dec-89	2	3.094	2150	174.7	18.4	43.0	13.6	43.0	13.6	69.0	122.9	81.9
08-Dec-89	2.1	3.249	2100	162.6	17.2	40.2	12.8	40.2	12.8	64.4	114.9	89.3
09-Dec-89	1.3	2.011	2040	254.6	26.4	63.4	20.1	63.4	20.1	101.6	180.8	84.3
10-Dec-89	1.2	1.857	1760	238.0	24.7	61.0	19.3	61.0	19.3	97.7	174.0	83.2
11-Dec-89	1	1.547	1590	257.9	26.7	67.5	21.4	67.5	21.4	108.0	192.3	93.0
12-Dec-89	1	1.547	1480	240.1	24.9	63.7	20.2	63.7	20.2	102.0	181.6	102.3
13-Dec-89	0.9	1.392	572	103.7	11.3	33.0	10.5	33.0	10.5	52.8	94.3	90.2
14-Dec-89	0.9	1.392	362	66.0	7.5	22.8	7.3	22.8	7.3	36.7	65.7	74.9
15-Dec-89	0.8	1.238	253	52.1	6.1	19.3	6.2	19.3	6.1	31.0	55.1	55.6
16-Dec-89	0.8	1.238	233	48.1	5.7	18.1	5.8	18.1	5.7	29.0	51.5	37.4
17-Dec-89	0.8	1.238	222	45.8	5.5	17.4	5.6	17.4	5.5	27.9	49.5	31.1
18-Dec-89	0.9	1.392	212	39.1	4.8	14.9	4.8	14.9	4.8	23.9	43.4	28.0
19-Dec-89	0.7	1.083	180	42.5	5.2	16.8	5.4	16.8	5.2	27.0	46.5	26.9

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs)	River Discharge Rate at USGS 12100000 (cfs)	Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox, 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs	
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L, WLA=WQS*DF-Ca*(DF-1)	WLA Running Averages for 4-day Averaging Period
				Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
20-Dec-89	0.7	1.083	130	31.0	4.0	13.0	4.2	13.0	4.0	20.8	36.1	24.9
21-Dec-89	0.8	1.238	125	26.2	3.5	11.0	3.6	11.0	3.5	17.7	31.8	22.4
22-Dec-89	0.7	1.083	129	30.8	4.0	12.9	4.2	12.9	4.0	20.7	35.9	21.5
23-Dec-89	0.7	1.083	127	30.3	3.9	12.7	4.1	12.7	3.9	20.4	35.5	19.9
24-Dec-89	0.6	0.928	121	33.6	4.3	14.3	4.6	14.3	4.3	22.9	38.4	20.4
25-Dec-89	0.6	0.928	125	34.7	4.4	14.6	4.7	14.6	4.4	23.5	39.4	21.9
26-Dec-89	0.7	1.083	128	30.5	4.0	12.8	4.2	12.8	4.0	20.6	35.7	21.9
27-Dec-89	1	1.547	134	22.7	3.2	9.3	3.1	9.3	3.1	15.0	28.0	20.5
28-Dec-89	0.8	1.238	126	26.4	3.5	11.1	3.6	11.1	3.5	17.8	32.0	19.2
29-Dec-89	0.8	1.238	124	26.0	3.5	10.9	3.6	10.9	3.5	17.6	31.6	17.8
30-Dec-89	0.8	1.238	125	26.2	3.5	11.0	3.6	11.0	3.5	17.7	31.8	17.0
31-Dec-89	1	1.547	127	21.5	3.1	9.0	3.0	9.0	3.0	14.4	27.0	16.9
01-Jan-90	1	1.547	134	22.7	3.2	9.3	3.1	9.3	3.1	15.0	28.0	16.2
02-Jan-90	1	1.547	123	20.9	3.0	8.7	2.9	8.7	2.9	14.1	26.4	15.3
03-Jan-90	1	1.547	126	21.4	3.0	8.9	3.0	8.9	3.0	14.3	26.8	14.5
04-Jan-90	1.1	1.702	142	21.9	3.1	8.9	3.0	8.9	3.0	14.4	26.8	14.5
05-Jan-90	2.3	3.559	156	12.0	2.1	4.7	1.8	4.7	1.8	7.6	16.0	12.6
06-Jan-90	2.2	3.404	235	18.3	2.7	6.7	2.3	6.7	2.3	10.9	21.1	11.8
07-Jan-90	3.8	5.879	797	34.9	4.4	10.3	3.4	10.3	3.4	16.6	30.6	12.4
08-Jan-90	4.8	7.427	1620	55.5	6.5	14.3	4.6	14.3	4.6	23.0	41.8	14.5
09-Jan-90	5.4	8.355	5320	160.2	16.9	33.1	10.5	33.1	10.5	53.0	94.6	25.9
10-Jan-90	3.5	5.415	5840	270.6	28.0	54.9	17.4	54.9	17.4	88.0	156.7	45.1
11-Jan-90	2.2	3.404	10800	794.2	80.3	143.3	45.3	143.3	45.3	229.3	408.0	98.3
12-Jan-90	1.6	2.476	4560	481.5	47.1	98.4	31.1	98.4	31.1	157.6	280.4	132.0
13-Jan-90	1.3	2.011	2480	309.2	31.8	74.2	23.5	74.2	23.5	118.8	211.5	148.4
14-Jan-90	1.2	1.857	1980	267.6	27.7	67.1	21.2	67.1	21.2	107.4	191.2	153.3
15-Jan-90	1.3	2.011	1880	234.7	24.4	59.4	18.8	59.4	18.8	95.1	169.4	119.8
16-Jan-90	1.1	1.702	1760	259.5	26.9	66.6	21.1	66.6	21.1	106.6	189.7	107.0
17-Jan-90	1	1.547	713	116.2	12.5	35.4	11.2	35.4	11.2	56.8	101.3	91.5
18-Jan-90	1	1.547	829	135.0	14.4	40.0	12.7	40.0	12.7	64.1	114.2	80.6
19-Jan-90	1	1.547	756	123.2	13.2	37.1	11.8	37.1	11.8	59.5	106.1	71.7
20-Jan-90	0.7	1.083	767	178.0	18.7	53.6	17.0	53.6	17.0	85.9	152.9	66.6
21-Jan-90	0.9	1.392	1120	202.1	21.1	56.6	17.9	56.6	17.9	90.6	161.3	75.0
22-Jan-90	1.5	2.321	1410	152.9	16.2	40.9	13.0	40.9	13.0	65.5	116.7	75.4
23-Jan-90	1.3	2.011	1350	168.8	17.8	45.5	14.4	45.5	14.4	72.9	129.9	78.7
24-Jan-90	1	1.547	757	123.3	13.2	37.2	11.8	37.2	11.8	59.6	106.2	72.1
25-Jan-90	1.7	2.630	301	29.6	3.9	10.5	3.5	10.5	3.5	16.9	31.2	53.7
26-Jan-90	1.3	2.011	238	30.6	4.0	11.4	3.7	11.4	3.7	18.3	33.5	41.9
27-Jan-90	1.7	2.630	184	18.5	2.7	7.1	2.4	7.1	2.4	11.5	22.1	26.8
28-Jan-90	2.3	3.559	270	20.0	2.9	7.2	2.5	7.2	2.5	11.6	22.2	14.6
29-Jan-90	2	3.094	251	21.3	3.0	7.8	2.6	7.8	2.6	12.5	23.8	13.5
30-Jan-90	1.7	2.630	169	17.1	2.6	6.7	2.3	6.7	2.3	10.8	20.9	11.6
31-Jan-90	1.8	2.785	147	14.2	2.3	5.7	2.0	5.7	2.0	9.2	18.4	11.0
01-Feb-90	1.6	2.476	146	15.7	2.5	6.3	2.2	6.3	2.2	10.2	20.0	10.7
02-Feb-90	1.5	2.321	138	15.9	2.5	6.4	2.2	6.4	2.2	10.4	20.3	10.2
03-Feb-90	1.8	2.785	156	15.0	2.4	5.9	2.1	5.9	2.1	9.6	19.1	9.9
04-Feb-90	1.8	2.785	156	15.0	2.4	5.9	2.1	5.9	2.1	9.6	19.1	10.0
05-Feb-90	1.8	2.785	149	14.4	2.3	5.7	2.0	5.7	2.0	9.3	18.5	9.7
06-Feb-90	1.7	2.630	147	15.0	2.4	6.0	2.1	6.0	2.1	9.7	19.2	9.8
07-Feb-90	1.6	2.476	141	15.2	2.4	6.2	2.2	6.2	2.2	10.0	19.6	9.6
08-Feb-90	1.7	2.630	149	15.2	2.4	6.1	2.1	6.1	2.1	9.8	19.4	9.7
09-Feb-90	1.9	2.940	160	14.6	2.4	5.8	2.1	5.8	2.1	9.3	18.6	9.7
10-Feb-90	1.9	2.940	2300	196.6	20.6	47.8	15.2	47.8	15.2	78.6	136.5	26.4
11-Feb-90	1.9	2.940	3940	336.1	34.5	73.7	23.3	73.7	23.3	118.0	210.0	53.4
12-Feb-90	1.7	2.630	2480	234.8	24.4	56.4	17.9	56.4	17.9	90.3	160.8	73.6
13-Feb-90	1.6	2.476	1960	198.9	20.8	49.9	15.8	49.9	15.8	80.0	142.4	91.2
14-Feb-90	1.3	2.011	1560	194.9	20.4	51.1	16.2	51.1	16.2	81.9	145.9	92.6
15-Feb-90	1.6	2.476	1460	148.4	15.7	39.4	12.5	39.4	12.5	63.1	112.6	78.8
16-Feb-90	1.4	2.166	1230	143.0	15.2	39.2	12.4	39.2	12.4	62.9	112.1	72.0
17-Feb-90	1.1	1.702	949	140.4	14.9	40.5	12.8	40.5	12.8	64.9	115.7	68.2
18-Feb-90	1	1.547	868	141.3	15.0	41.5	13.2	41.5	13.2	66.5	118.5	64.4
19-Feb-90	1.1	1.702	824	122.0	13.1	36.2	11.5	36.2	11.5	58.0	103.4	63.1
20-Feb-90	1.9	2.940	1100	94.5	10.4	26.4	8.4	26.4	8.4	42.4	75.9	57.9
21-Feb-90	1.7	2.630	1360	130.3	13.9	35.0	11.1	35.0	11.1	56.2	100.2	55.8
22-Feb-90	1.3	2.011	564	71.1	8.0	22.6	7.2	22.6	7.2	36.3	65.0	48.2
23-Feb-90	1.2	1.857	757	102.9	11.2	31.0	9.8	31.0	9.8	49.7	88.7	46.1
24-Feb-90	0.9	1.392	583	105.7	11.5	33.5	10.6	33.5	10.6	53.7	95.8	48.9
25-Feb-90	0.9	1.392	663	120.0	12.9	37.1	11.8	37.1	11.8	59.5	106.1	49.8
26-Feb-90	0.9	1.392	622	112.7	12.2	35.3	11.2	35.3	11.2	56.5	100.8	54.8
27-Feb-90	1	1.547	300	49.5	5.8	17.7	5.7	17.7	5.7	28.4	51.2	49.6
28-Feb-90	0.8	1.238	230	47.5	5.6	17.9	5.7	17.9	5.6	28.7	50.9	43.3
01-Mar-90	0.8	1.238	240	49.5	5.8	18.5	5.9	18.5	5.8	29.7	52.7	35.8
02-Mar-90	0.8	1.238	130	27.3	3.6	11.4	3.7	11.4	3.6	18.3	32.7	26.3
03-Mar-90	0.8	1.238	125	26.2	3.5	11.0	3.6	11.0	3.5	17.7	31.8	23.6
04-Mar-90	0.7	1.083	120	28.7	3.8	12.2	4.0	12.2	3.8	19.6	34.0	21.3
05-Mar-90	0.7	1.083	200	47.2	5.6	18.3	5.8	18.3	5.6	29.3	50.6	21.2
06-Mar-90	0.9	1.392	512	92.9	10.2	30.2	9.6	30.2	9.6	48.4	86.4	28.7
07-Mar-90	1.5	2.321	329	36.4	4.5	12.8	4.1	12.8	4.1	20.5	37.4	29.4
08-Mar-90	1.7	2.630	362	35.4	4.4	12.2	4.0	12.2	4.0	19.6	35.7	29.4
09-Mar-90	1.7	2.630	210	21.0	3.0	7.9	2.7	7.9	2.7	12.8	24.2	25.3
10-Mar-90	1.6	2.476	354	38.5	4.6	12.7	4.1	12.7	4.1	20.4	37.2	18.3
11-Mar-90	1.4	2.166	190	22.9	3.2	8.8	3.0	8.8	3.0	14.2	26.7	16.7
12-Mar-90	1.2	1.857	130	18.5	2.8	7.6	2.6	7.6	2.6	12.3	23.4	14.9

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

				Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox, 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L. WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs):	River Discharge Rate at USGS 12100000 (cfs)	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
13-Mar-90	1.3	2.011	120	15.9	2.5	6.6	2.3	6.6	2.3	10.7	20.8	14.4
14-Mar-90	1.2	1.857	140	19.9	2.9	8.1	2.7	8.1	2.7	13.0	24.7	12.6
15-Mar-90	1.4	2.166	555	66.1	7.4	20.7	6.6	20.7	6.6	33.3	59.7	17.3
16-Mar-90	1.1	1.702	1030	152.3	16.1	43.3	13.7	43.3	13.7	69.3	123.6	31.6
17-Mar-90	1.2	1.857	925	125.6	13.5	36.4	11.5	36.4	11.5	58.3	104.0	43.5
18-Mar-90	1.2	1.857	208	29.0	3.8	11.0	3.6	11.0	3.6	17.8	32.7	44.7
19-Mar-90	1.1	1.702	389	58.1	6.7	19.8	6.3	19.8	6.3	31.8	57.2	44.3
20-Mar-90	1.1	1.702	749	111.0	12.0	33.5	10.6	33.5	10.6	53.7	95.8	40.4
21-Mar-90	1.1	1.702	731	108.4	11.7	32.9	10.4	32.9	10.4	52.7	94.0	39.0
22-Mar-90	1.4	2.166	468	55.0	6.4	18.1	5.8	18.1	5.8	29.0	52.3	41.8
23-Mar-90	1.4	2.166	724	84.6	9.4	25.6	8.2	25.6	8.2	41.1	73.6	44.1
24-Mar-90	1.1	1.702	568	84.4	9.3	26.8	8.5	26.8	8.5	43.0	77.0	41.5
25-Mar-90	1	1.547	283	46.7	5.6	16.9	5.4	16.9	5.4	27.1	49.0	35.1
26-Mar-90	1	1.547	125	21.2	3.0	8.8	3.0	8.8	3.0	14.3	26.7	31.4
27-Mar-90	0.8	1.238	111	23.4	3.2	10.0	3.3	10.0	3.2	16.1	29.3	25.1
28-Mar-90	0.9	1.392	117	22.0	3.1	9.3	3.1	9.3	3.1	15.0	27.9	18.1
29-Mar-90	0.9	1.392	113	21.3	3.0	9.1	3.0	9.1	3.0	14.6	27.3	15.0
30-Mar-90	0.7	1.083	439	102.3	11.1	34.3	10.9	34.3	10.9	54.9	98.0	25.2
31-Mar-90	0.7	1.083	222	52.2	6.1	19.8	6.3	19.8	6.1	31.8	55.2	29.1
01-Apr-90	0.6	0.928	134	37.1	4.6	15.5	5.0	15.5	4.6	24.8	41.6	31.5
02-Apr-90	0.9	1.392	367	66.9	7.6	23.1	7.4	23.1	7.4	37.1	66.4	37.2
03-Apr-90	0.7	1.083	401	93.6	10.3	31.9	10.1	31.9	10.1	51.1	91.2	36.2
04-Apr-90	0.7	1.083	339	79.3	8.8	27.8	8.9	27.8	8.8	44.6	79.5	39.4
05-Apr-90	0.6	0.928	369	100.4	10.9	34.7	11.0	34.7	10.9	55.7	98.5	47.1
06-Apr-90	0.7	1.083	298	69.8	7.9	25.1	8.0	25.1	7.9	40.3	71.0	47.9
07-Apr-90	0.6	0.928	398	108.2	11.7	36.9	11.7	36.9	11.7	59.2	105.5	49.9
08-Apr-90	0.6	0.928	568	154.0	16.3	49.1	15.6	49.1	15.6	78.7	140.2	58.5
09-Apr-90	0.8	1.238	381	78.0	8.7	26.8	8.5	26.8	8.5	42.9	76.8	55.3
10-Apr-90	0.6	0.928	633	171.5	18.0	53.6	17.0	53.6	17.0	85.9	152.9	66.7
11-Apr-90	0.7	1.083	708	164.4	17.3	50.3	15.9	50.3	15.9	80.5	143.4	72.0
12-Apr-90	0.6	0.928	581	157.5	16.6	50.0	15.8	50.0	15.8	80.1	142.7	72.4
13-Apr-90	1	1.547	507	82.9	9.2	26.9	8.6	26.9	8.6	43.2	77.3	72.4
14-Apr-90	0.7	1.083	1150	266.5	27.5	74.3	23.5	74.3	23.5	118.9	211.6	80.7
15-Apr-90	0.7	1.083	1580	365.7	37.5	95.9	30.3	95.9	30.3	153.5	273.1	98.9
16-Apr-90	1.1	1.702	1720	253.7	26.3	65.3	20.7	65.3	20.7	104.6	186.3	105.1
17-Apr-90	0.8	1.238	1670	338.3	34.7	87.7	27.8	87.7	27.8	140.4	249.9	129.4
18-Apr-90	0.7	1.083	1420	328.8	33.8	88.0	27.8	88.0	27.8	140.9	250.6	134.9
19-Apr-90	0.7	1.083	1420	328.8	33.8	88.0	27.8	88.0	27.8	140.9	250.6	131.7
20-Apr-90	0.9	1.392	1170	211.1	22.0	58.6	18.5	58.6	18.5	93.8	167.0	129.0
21-Apr-90	0.7	1.083	900	208.7	21.8	61.0	19.3	61.0	19.3	97.7	173.8	118.3
22-Apr-90	1.1	1.702	788	116.8	12.6	34.9	11.1	34.9	11.1	55.9	99.8	97.1
23-Apr-90	1.2	1.857	1540	208.4	21.7	54.8	17.4	54.8	17.4	87.8	156.3	83.8
24-Apr-90	1	1.547	1830	296.7	30.6	75.5	23.9	75.5	23.9	121.0	215.3	90.6
25-Apr-90	1.4	2.166	771	90.0	9.9	27.0	8.6	27.0	8.6	43.2	77.3	77.0
26-Apr-90	1.2	1.857	1010	137.0	14.6	39.1	12.4	39.1	12.4	62.6	111.6	78.6
27-Apr-90	1.9	2.940	989	85.1	9.4	24.3	7.7	24.3	7.7	39.0	69.7	66.4
28-Apr-90	1.8	2.785	1220	110.5	12.0	30.3	9.6	30.3	9.6	48.6	86.8	48.4
29-Apr-90	1.9	2.940	1360	116.7	12.6	31.4	10.0	31.4	10.0	50.3	89.7	50.1
30-Apr-90	1.6	2.476	1120	114.1	12.3	31.8	10.1	31.8	10.1	51.1	91.1	47.2
01-Nov-90	1.3	2.011	171	22.3	3.1	8.8	2.9	8.8	2.9	14.1	26.4	
02-Nov-90	1.1	1.702	170	26.0	3.5	10.3	3.4	10.3	3.4	16.5	30.5	
03-Nov-90	1.3	2.011	227	29.2	3.8	10.9	3.6	10.9	3.6	17.6	32.4	
04-Nov-90	1.4	2.166	1010	117.6	12.7	33.5	10.6	33.5	10.6	53.7	95.8	25.5
05-Nov-90	1	1.547	781	127.2	13.6	38.1	12.1	38.1	12.1	61.1	108.9	37.2
06-Nov-90	1.2	1.857	195	27.3	3.6	10.5	3.5	10.5	3.5	16.9	31.2	37.3
07-Nov-90	1.3	2.011	168	21.9	3.1	8.6	2.9	8.6	2.9	13.9	26.1	36.4
08-Nov-90	1.5	2.321	169	19.2	2.8	7.5	2.6	7.5	2.6	12.2	23.2	26.0
09-Nov-90	3.8	5.879	717	31.5	4.0	9.5	3.1	9.5	3.1	15.2	28.3	14.6
10-Nov-90	2.7	4.177	2520	151.8	16.1	36.2	11.5	36.2	11.5	58.1	103.8	24.8
11-Nov-90	1.7	2.630	1550	148.3	15.7	38.9	12.3	38.9	12.3	62.4	111.2	37.0
12-Nov-90	2.6	4.023	1030	65.0	7.4	18.4	5.9	18.4	5.9	29.5	53.1	41.3
13-Nov-90	4.4	6.808	1240	46.5	5.6	12.6	4.1	12.6	4.1	20.3	37.1	42.6
14-Nov-90	2.9	4.487	1630	91.8	10.1	23.8	7.6	23.8	7.6	38.2	68.3	37.6
15-Nov-90	2.2	3.404	1500	111.2	12.0	29.3	9.3	29.3	9.3	47.0	83.9	33.7
16-Nov-90	1.6	2.476	1100	112.1	12.1	31.4	10.0	31.4	10.0	50.3	89.8	38.9
17-Nov-90	2.1	3.249	584	45.9	5.5	14.4	4.7	14.4	4.7	23.2	42.1	39.7
18-Nov-90	1.7	2.630	459	44.6	5.4	14.7	4.7	14.7	4.7	23.6	42.8	36.0
19-Nov-90	1.6	2.476	279	29.2	3.8	10.5	3.5	10.5	3.5	16.9	31.2	28.5
20-Nov-90	1.6	2.476	193	20.5	2.9	7.9	2.7	7.9	2.7	12.7	24.0	19.1
21-Nov-90	2.6	4.023	179	12.1	2.1	4.7	1.8	4.7	1.8	7.6	15.9	15.2
22-Nov-90	3.1	4.796	727	38.9	4.8	11.7	3.8	11.7	3.8	18.8	34.4	14.0
23-Nov-90	3.9	6.034	2350	98.4	10.7	23.7	7.6	23.7	7.6	38.1	68.2	19.3
24-Nov-90	5	7.736	3840	125.1	13.4	27.5	8.7	27.5	8.7	44.1	78.8	27.1
25-Nov-90	4.1	6.344	3960	157.1	16.6	34.3	10.9	34.3	10.9	55.0	98.2	39.0
26-Nov-90	2.7	4.177	4970	298.4	30.7	62.5	19.8	62.5	19.8	100.2	178.3	59.3
27-Nov-90	2	3.094	5390	436.5	44.5	90.1	28.5	90.1	28.5	144.3	256.7	85.9
28-Nov-90	1.7	2.630	5770	549.4	55.8	112.0	35.4	112.0	35.4	179.2	318.9	119.7
29-Nov-90	2.7	4.177	5240	314.6	32.4	65.3	20.7	65.3	20.7	104.5	186.0	132.0
30-Nov-90	2.2	3.404	3280	241.9	25.1	54.9	17.4	54.9	17.4	88.0	156.7	129.0
01-Dec-90	2.5	3.868	2630	171.0	18.0	40.5	12.8	40.5	12.8	64.9	115.7	109.2
02-Dec-90	2.3	3.559	2310	163.3	17.2	39.6	12.6	39.6	12.6	63.5	113.3	80.2
03-Dec-90	3.1	4.796	2150	113.1	12.2	27.8	8.8	27.8	8.8	44.6	79.7	65.2

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs)	River Discharge Rate at USGS 12100000 (cfs)	Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox, 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mg/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
				Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mg/L)	Acute (mg/L)	Chronic (mg/L)
04-Dec-90	3	4.642	2450	133.0	14.2	31.9	10.1	31.9	10.1	51.1	91.3	56.0
05-Dec-90	2.6	4.023	2070	129.6	13.9	32.1	10.2	32.1	10.2	51.5	91.9	52.7
06-Dec-90	2.3	3.559	1720	121.8	13.1	31.3	9.9	31.3	9.9	50.2	89.6	49.3
07-Dec-90	2.2	3.404	1390	103.1	11.2	27.6	8.8	27.6	8.8	44.2	79.0	49.2
08-Dec-90	2.1	3.249	1340	104.1	11.3	28.0	8.9	28.0	8.9	45.0	80.4	47.7
09-Dec-90	2.5	3.868	1500	97.9	10.7	25.8	8.2	25.8	8.2	41.4	74.0	45.2
10-Dec-90	3.2	4.951	1720	87.9	9.7	22.5	7.2	22.5	7.2	36.1	64.7	41.7
11-Dec-90	2.7	4.177	1750	105.7	11.5	27.0	8.6	27.0	8.6	43.4	77.5	41.5
12-Dec-90	2.3	3.559	1620	114.8	12.4	29.8	9.5	29.8	9.5	47.8	85.4	42.2
13-Dec-90	2.1	3.249	1350	104.9	11.4	28.2	9.0	28.2	9.0	45.2	80.8	43.1
14-Dec-90	1.9	2.940	1200	103.1	11.2	28.4	9.0	28.4	9.0	45.5	81.3	45.5
15-Dec-90	1.9	2.940	1130	97.1	10.6	27.0	8.6	27.0	8.6	43.3	77.5	45.5
16-Dec-90	2	3.094	1050	85.8	9.5	24.2	7.7	24.2	7.7	38.8	69.5	43.2
17-Dec-90	2	3.094	1150	93.9	10.3	26.0	8.3	26.0	8.3	41.8	74.7	42.4
18-Dec-90	1.9	2.940	1410	120.9	13.0	32.3	10.3	32.3	10.3	51.7	92.4	43.9
19-Dec-90	1.9	2.940	1180	101.4	11.0	28.0	8.9	28.0	8.9	44.9	80.2	44.3
20-Dec-90	2	3.094	1150	93.9	10.3	26.0	8.3	26.0	8.3	41.8	74.7	45.0
21-Dec-90	1.9	2.940	1170	100.5	11.0	27.8	8.8	27.8	8.8	44.6	79.6	45.7
22-Dec-90	1.7	2.630	1360	130.3	13.9	35.0	11.1	35.0	11.1	56.2	100.2	46.8
23-Dec-90	1.8	2.785	1260	114.1	12.3	31.1	9.9	31.1	9.9	49.9	89.1	48.1
24-Dec-90	1.6	2.476	1180	120.2	12.9	33.2	10.5	33.2	10.5	53.2	95.0	51.0
25-Dec-90	1.6	2.476	1110	113.1	12.2	31.6	10.0	31.6	10.0	50.7	90.5	52.5
26-Dec-90	1.9	2.940	856	73.8	8.3	21.6	6.9	21.6	6.9	34.7	62.3	47.1
27-Dec-90	1.8	2.785	777	70.7	8.0	21.1	6.7	21.1	6.7	33.9	60.8	43.1
28-Dec-90	2.1	3.249	429	34.0	4.3	11.3	3.7	11.3	3.7	18.2	33.4	34.4
29-Dec-90	1.8	2.785	238	22.4	3.1	8.3	2.8	8.3	2.8	13.3	25.1	25.0
30-Dec-90	1.7	2.630	297	29.2	3.8	10.4	3.4	10.4	3.4	16.7	30.9	20.5
31-Dec-90	1.9	2.940	259	23.0	3.2	8.4	2.8	8.4	2.8	13.5	25.4	15.4
01-Jan-91	1.5	2.321	209	23.5	3.3	8.9	3.0	8.9	3.0	14.4	26.9	14.5
02-Jan-91	1.8	2.476	182	19.4	2.8	7.5	2.6	7.5	2.6	12.1	23.1	14.2
03-Jan-91	1.5	2.321	172	19.5	2.9	7.6	2.6	7.6	2.6	12.3	23.5	13.1
04-Jan-91	1.5	2.321	174	19.7	2.9	7.7	2.6	7.7	2.6	12.4	23.7	12.8
05-Jan-91	1.3	2.011	180	23.4	3.2	9.1	3.0	9.1	3.0	14.7	27.4	12.9
06-Jan-91	1.5	2.321	180	20.4	2.9	7.9	2.7	7.9	2.7	12.8	24.2	13.1
07-Jan-91	2.3	3.559	180	13.6	2.3	5.3	1.9	5.3	1.9	8.5	17.3	12.1
08-Jan-91	2.7	4.177	180	11.8	2.1	4.5	1.7	4.5	1.7	7.3	15.5	10.8
09-Jan-91	3	4.642	182	10.8	2.0	4.1	1.6	4.1	1.6	6.7	14.6	8.8
10-Jan-91	3.2	4.951	212	11.7	2.1	4.4	1.7	4.4	1.7	7.1	15.2	7.4
11-Jan-91	3.5	5.415	213	10.8	2.0	4.0	1.6	4.0	1.6	6.5	14.4	6.9
12-Jan-91	4.6	7.117	891	32.3	4.1	9.3	3.1	9.3	3.1	15.0	27.9	8.8
13-Jan-91	3.6	5.570	2110	95.7	10.5	23.6	7.5	23.6	7.5	37.8	67.8	16.8
14-Jan-91	3.7	5.725	2160	95.3	10.4	23.4	7.5	23.4	7.5	37.5	67.2	24.2
15-Jan-91	2.7	4.177	2210	133.3	14.2	32.6	10.4	32.6	10.4	52.3	93.3	35.7
16-Jan-91	2.1	3.249	1540	119.5	12.8	31.4	10.0	31.4	10.0	50.3	89.7	44.5
17-Jan-91	2.1	3.249	1240	96.4	10.5	26.4	8.4	26.4	8.4	42.3	75.6	45.6
18-Jan-91	1.7	2.630	1050	100.8	11.0	28.5	9.1	28.5	9.1	45.6	81.6	47.6
19-Jan-91	1.7	2.630	885	85.1	9.4	24.8	7.9	24.8	7.9	39.8	71.3	44.5
20-Jan-91	1.5	2.321	740	80.7	9.0	24.4	7.8	24.4	7.8	39.1	70.0	41.7
21-Jan-91	1.5	2.321	532	58.3	6.7	18.7	6.0	18.7	6.0	30.0	54.0	38.6
22-Jan-91	1.5	2.321	248	27.7	3.7	10.2	3.4	10.2	3.4	16.4	30.3	31.3
23-Jan-91	1.4	2.166	194	23.4	3.2	9.0	3.0	9.0	3.0	14.5	27.1	25.0
24-Jan-91	1.4	2.166	176	21.3	3.0	8.3	2.8	8.3	2.8	13.4	25.3	18.6
25-Jan-91	1.4	2.166	176	21.3	3.0	8.3	2.8	8.3	2.8	13.4	25.3	14.4
26-Jan-91	1.2	1.857	175	24.6	3.4	9.6	3.2	9.6	3.2	15.5	28.8	14.2
27-Jan-91	1.4	2.166	177	21.4	3.0	8.4	2.8	8.4	2.8	13.5	25.4	14.0
28-Jan-91	1.3	2.011	178	23.1	3.2	9.0	3.0	9.0	3.0	14.6	27.2	14.2
29-Jan-91	1.3	2.011	240	30.8	4.0	11.4	3.7	11.4	3.7	18.4	33.8	15.5
30-Jan-91	1.5	2.321	175	19.9	2.9	7.8	2.6	7.8	2.6	12.5	23.8	14.7
31-Jan-91	1.6	2.476	177	18.9	2.8	7.3	2.5	7.3	2.5	11.9	22.7	14.3
01-Feb-91	1.2	1.857	173	24.3	3.3	9.6	3.2	9.6	3.2	15.4	28.6	14.5
02-Feb-91	2.4	3.713	189	13.7	2.3	5.2	1.9	5.2	1.9	8.5	17.3	12.1
03-Feb-91	2.7	4.177	568	35.0	4.4	11.0	3.6	11.0	3.6	17.7	32.6	13.4
04-Feb-91	3.4	5.260	667	32.7	4.2	10.0	3.3	10.0	3.3	16.0	29.7	14.4
05-Feb-91	2.7	4.177	1760	106.3	11.5	27.2	8.6	27.2	8.6	43.6	77.9	21.4
06-Feb-91	2	3.094	1700	138.3	14.7	35.6	11.3	35.6	11.3	57.1	101.9	33.6
07-Feb-91	1.7	2.630	989	95.0	10.4	27.1	8.6	27.1	8.6	43.5	77.8	40.1
08-Feb-91	1.5	2.321	390	43.0	5.2	14.6	4.7	14.6	4.7	23.5	42.5	41.9
09-Feb-91	1.5	2.321	173	19.6	2.9	7.7	2.6	7.7	2.6	12.4	23.6	34.1
10-Feb-91	1.3	2.011	171	22.3	3.1	8.8	2.9	8.8	2.9	14.1	26.4	23.4
11-Feb-91	1.7	2.630	172	17.3	2.6	6.8	2.3	6.8	2.3	10.9	21.2	15.2
12-Feb-91	1.8	2.785	178	17.0	2.6	6.6	2.3	6.6	2.3	10.6	20.7	12.0
13-Feb-91	2.9	4.487	325	19.1	2.8	6.6	2.3	6.6	2.3	10.7	20.8	11.6
14-Feb-91	2.4	3.713	1740	118.1	12.7	30.3	9.6	30.3	9.6	48.5	88.7	20.2
15-Feb-91	2.2	3.404	2000	147.9	15.7	36.9	11.7	36.9	11.7	59.2	105.5	32.3
16-Feb-91	1.8	2.785	1490	134.8	14.4	35.6	11.3	35.6	11.3	57.1	101.8	43.9
17-Feb-91	1.8	2.785	1280	115.9	12.5	31.5	10.0	31.5	10.0	50.5	90.2	53.8
18-Feb-91	1.5	2.321	613	67.0	7.6	21.0	6.7	21.0	6.7	33.6	60.3	50.1
19-Feb-91	5	7.736	3030	98.9	10.8	22.7	7.2	22.7	7.2	36.5	65.3	44.4
20-Feb-91	4.3	6.653	4900	185.1	19.4	38.8	12.3	38.8	12.3	62.3	111.0	45.7
21-Feb-91	2.7	4.177	4260	255.9	26.5	55.2	17.5	55.2	17.5	88.5	157.8	55.2
22-Feb-91	2	3.094	3980	322.5	33.2	70.6	22.3	70.6	22.3	113.1	201.2	75.1
23-Feb-91	1.7	2.630	3690	351.7	36.1	78.1	24.7	78.1	24.7	125.1	222.7	97.2
24-Feb-91	1.7	2.630	2420	231.0	24.0	55.7	17.6	55.7	17.6	89.2	158.7	104.0

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation.)

Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs)	River Discharge Rate at USGS 12100000 (cfs)	Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox 1995; Fischer et al 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mg/N/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
				Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mg/N/L)	Acute (mg/N/L)	Chronic (mg/N/L)
25-Feb-91	1.5	2.321	1810	196.0	20.5	49.9	15.8	49.9	15.8	80.0	142.5	101.8
26-Feb-91	1.5	2.321	1640	177.7	18.7	46.1	14.6	46.1	14.6	73.9	131.7	92.1
27-Feb-91	1.5	2.321	1380	149.7	15.9	40.2	12.7	40.2	12.7	64.4	114.7	78.9
28-Feb-91	1.4	2.166	433	51.0	6.0	17.0	5.5	17.0	5.5	27.3	49.2	61.4
01-Mar-91	1.7	2.630	686	66.2	7.5	20.2	6.5	20.2	6.5	32.5	58.3	49.5
02-Mar-91	2.3	3.559	610	43.9	5.3	13.7	4.4	13.7	4.4	21.9	39.9	36.5
03-Mar-91	2.7	4.177	505	31.2	4.0	10.0	3.3	10.0	3.3	16.2	29.9	24.5
04-Mar-91	3.3	5.106	620	31.4	4.0	9.7	3.2	9.7	3.2	15.6	29.0	21.5
05-Mar-91	2.4	3.713	344	24.2	3.3	8.3	2.8	8.3	2.8	13.4	25.3	16.8
06-Mar-91	2.1	3.249	210	17.2	2.6	6.4	2.2	6.4	2.2	10.4	20.3	13.9
07-Mar-91	1.9	2.940	160	14.6	2.4	5.8	2.1	5.8	2.1	9.3	18.6	12.2
08-Mar-91	1.9	2.940	138	12.7	2.2	5.1	1.9	5.1	1.9	8.3	17.0	10.4
09-Mar-91	2	3.094	131	11.6	2.1	4.7	1.8	4.7	1.8	7.6	16.0	8.9
10-Mar-91	1.9	2.940	155	14.2	2.3	5.6	2.0	5.6	2.0	9.1	18.2	8.6
11-Mar-91	2.4	3.713	135	10.1	1.9	4.1	1.6	4.1	1.6	6.6	14.5	7.9
12-Mar-91	2.7	4.177	180	11.8	2.1	4.5	1.7	4.5	1.7	7.3	15.5	7.7
13-Mar-91	2.2	3.404	144	11.6	2.1	4.6	1.7	4.6	1.7	7.5	15.8	7.6
14-Mar-91	2	3.094	143	12.6	2.2	5.0	1.9	5.0	1.9	8.2	16.8	7.4
15-Mar-91	1.7	2.630	139	14.2	2.3	5.7	2.1	5.7	2.1	9.3	18.6	8.1
16-Mar-91	1.6	2.476	145	15.6	2.5	6.3	2.2	6.3	2.2	10.2	19.9	8.8
17-Mar-91	1.5	2.321	143	16.4	2.5	6.6	2.3	6.6	2.3	10.7	20.8	9.6
18-Mar-91	1.7	2.630	142	14.5	2.3	5.8	2.1	5.8	2.1	9.4	18.8	9.9
19-Mar-91	1.6	2.476	147	15.8	2.5	6.4	2.2	6.4	2.2	10.3	20.1	10.1
20-Mar-91	1.5	2.321	144	16.5	2.6	6.7	2.3	6.7	2.3	10.8	20.9	10.3
21-Mar-91	1.5	2.321	142	16.3	2.5	6.6	2.3	6.6	2.3	10.6	20.7	10.3
22-Mar-91	1.5	2.321	142	16.3	2.5	6.6	2.3	6.6	2.3	10.6	20.7	10.6
23-Mar-91	1.3	2.011	136	17.9	2.7	7.3	2.5	7.3	2.5	11.8	22.6	11.0
24-Mar-91	1.7	2.630	142	14.5	2.3	5.8	2.1	5.8	2.1	9.4	18.8	10.6
25-Mar-91	1.7	2.630	143	14.6	2.4	5.9	2.1	5.9	2.1	9.5	18.9	10.3
26-Mar-91	1.6	2.476	138	14.9	2.4	6.1	2.1	6.1	2.1	9.8	19.3	10.1
27-Mar-91	1.4	2.166	139	17.0	2.6	6.9	2.4	6.9	2.4	11.2	21.6	10.0
28-Mar-91	1.5	2.321	141	16.2	2.5	6.6	2.3	6.6	2.3	10.6	20.6	10.3
29-Mar-91	1.3	2.011	138	18.2	2.7	7.4	2.5	7.4	2.5	11.9	22.8	10.9
30-Mar-91	1.3	2.011	137	18.0	2.7	7.4	2.5	7.4	2.5	11.9	22.7	11.4
31-Mar-91	1.2	1.857	144	20.4	2.9	8.3	2.8	8.3	2.8	13.3	25.1	11.9
01-Apr-91	1.4	2.166	138	16.9	2.6	6.9	2.4	6.9	2.4	11.1	21.5	12.1
02-Apr-91	1.4	2.166	141	17.3	2.6	7.0	2.4	7.0	2.4	11.3	21.8	11.9
03-Apr-91	2.3	3.559	139	10.8	2.0	4.3	1.7	4.3	1.7	7.0	15.1	10.7
04-Apr-91	5.1	7.891	647	21.5	3.0	6.5	2.3	6.5	2.3	10.6	20.6	10.0
05-Apr-91	4.7	7.272	3040	105.5	11.5	24.2	7.7	24.2	7.7	38.9	69.6	16.9
06-Apr-91	3.1	4.796	3120	163.6	17.3	37.5	11.9	37.5	11.9	60.1	107.1	29.1
07-Apr-91	2.3	3.559	1560	110.6	12.0	28.9	9.2	28.9	9.2	46.4	82.9	39.0
08-Apr-91	2.9	4.487	1390	78.4	8.7	20.9	6.7	20.9	6.7	33.6	60.3	44.7
09-Apr-91	3	4.642	1360	74.3	8.3	19.9	6.4	19.9	6.4	31.9	57.4	43.0
10-Apr-91	3.2	4.951	1210	62.1	7.1	17.0	5.5	17.0	5.5	27.3	49.2	34.8
11-Apr-91	2.3	3.559	961	68.5	7.8	19.6	6.3	19.6	6.3	31.5	56.6	31.1
12-Apr-91	1.9	2.940	894	77.0	8.6	22.4	7.1	22.4	7.1	35.9	64.4	31.7
13-Apr-91	1.6	2.476	872	89.1	9.8	26.1	8.3	26.1	8.3	41.8	74.7	34.1
14-Apr-91	1.7	2.630	864	83.1	9.2	24.3	7.8	24.3	7.8	39.1	69.9	37.1
15-Apr-91	1.7	2.630	870	83.7	9.3	24.5	7.8	24.5	7.8	39.3	70.3	39.0
16-Apr-91	1.6	2.476	880	89.9	9.9	26.2	8.4	26.2	8.4	42.1	75.3	40.6
17-Apr-91	1.4	2.166	796	92.9	10.2	27.7	8.8	27.7	8.8	44.4	79.3	41.2
18-Apr-91	1.7	2.630	657	63.4	7.2	19.6	6.3	19.6	6.3	31.4	56.4	39.3
19-Apr-91	1.4	2.166	635	74.3	8.3	23.1	7.4	23.1	7.4	37.0	66.3	38.7
20-Apr-91	1.3	2.011	631	79.4	8.8	24.7	7.9	24.7	7.9	39.7	71.0	38.1
21-Apr-91	1.3	2.011	639	80.4	8.9	25.0	8.0	25.0	8.0	40.1	71.7	37.0
22-Apr-91	1.5	2.321	683	74.6	8.4	22.8	7.3	22.8	7.3	36.7	65.7	38.4
23-Apr-91	1	1.547	690	112.5	12.1	34.5	11.0	34.5	11.0	55.3	98.7	42.9
24-Apr-91	1	1.547	704	114.8	12.4	35.1	11.1	35.1	11.1	56.2	100.2	47.1
25-Apr-91	1	1.547	832	103.1	11.2	32.2	10.2	32.2	10.2	51.5	92.0	49.9
26-Apr-91	1	1.547	598	97.6	10.7	30.8	9.8	30.8	9.8	49.3	88.1	53.1
27-Apr-91	0.9	1.392	569	103.2	11.2	32.8	10.4	32.8	10.4	52.5	93.9	52.4
28-Apr-91	1	1.547	552	90.2	9.9	28.8	9.2	28.8	9.2	46.3	82.6	49.9
29-Apr-91	1	1.547	578	94.4	10.3	29.9	9.5	29.9	9.5	48.0	85.7	49.0
30-Apr-91	0.8	1.238	557	113.5	12.3	36.3	11.5	36.3	11.5	58.2	103.7	51.3
01-Nov-91	0.6	0.928	136	37.6	4.7	15.6	5.0	15.6	4.7	25.1	42.1	
02-Nov-91	0.5	0.774	132	43.7	5.3	18.3	5.9	18.3	5.3	29.4	47.5	
03-Nov-91	0.5	0.774	132	43.7	5.3	18.3	5.9	18.3	5.3	29.4	47.5	
04-Nov-91	1.1	1.702	139	21.4	3.0	8.8	2.9	8.8	2.9	14.1	26.4	24.5
05-Nov-91	0.7	1.083	557	129.6	13.9	41.5	13.1	41.5	13.1	66.4	118.4	34.8
06-Nov-91	0.6	0.928	204	56.9	6.5	21.6	6.9	21.6	6.5	34.7	58.5	36.2
07-Nov-91	0.6	0.928	129	35.7	4.5	15.0	4.8	15.0	4.5	24.1	40.4	34.8
08-Nov-91	0.8	1.238	141	29.5	3.8	12.1	3.9	12.1	3.8	19.5	34.7	36.2
09-Nov-91	0.7	1.083	132	31.5	4.0	13.1	4.3	13.1	4.0	21.1	36.5	24.8
10-Nov-91	0.7	1.083	137	32.6	4.2	13.5	4.4	13.5	4.2	21.7	37.6	21.6
11-Nov-91	1.3	2.011	143	18.8	2.5	7.6	2.6	7.6	2.6	12.3	23.4	18.6
12-Nov-91	0.9	1.392	139	26.0	3.5	10.7	3.5	10.7	3.5	17.2	31.6	18.1
13-Nov-91	0.9	1.392	149	27.8	3.7	11.3	3.7	11.3	3.7	18.1	33.2	17.3
14-Nov-91	0.7	1.083	141	33.5	4.3	13.8	4.5	13.8	4.3	22.2	38.4	17.4
15-Nov-91	0.7	1.083	134	31.9	4.1	13.3	4.3	13.3	4.1	21.3	36.9	19.7
16-Nov-91	0.9	1.392	137	25.6	3.5	10.5	3.5	10.5	3.5	17.0	31.2	19.7
17-Nov-91	1	1.547	160	30.1	3.9	11.8	3.8	11.8	3.8	19.0	34.7	19.9

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

				Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox, 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs):	River Discharge Rate at USGS 12100000 (cfs)	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
18-Nov-91	1	1.547	149	25.1	3.4	10.2	3.3	10.2	3.3	16.3	30.2	18.4
19-Nov-91	1.1	1.702	143	22.0	3.1	9.0	3.0	9.0	3.0	14.4	27.0	16.7
20-Nov-91	1.6	2.476	695	71.2	8.0	21.7	6.9	21.7	6.9	34.9	62.5	21.2
21-Nov-91	1	1.547	218	36.2	4.5	13.7	4.4	13.7	4.4	22.1	40.1	21.9
22-Nov-91	0.9	1.392	134	25.1	3.4	10.4	3.4	10.4	3.4	16.7	30.8	22.0
23-Nov-91	1	1.547	137	23.1	3.2	9.5	3.2	9.5	3.2	15.3	28.5	22.2
24-Nov-91	2	3.094	156	13.6	2.3	5.4	1.9	5.4	1.9	8.7	17.8	15.7
25-Nov-91	2.1	3.249	1300	101.0	11.0	27.4	8.7	27.4	8.7	43.9	78.5	21.1
26-Nov-91	2.5	3.868	1870	121.9	13.1	30.8	9.8	30.8	9.8	49.4	88.1	29.3
27-Nov-91	2	3.094	1470	119.8	12.9	31.7	10.1	31.7	10.1	50.8	90.8	38.2
28-Nov-91	1.2	1.857	1030	139.7	14.9	39.7	12.6	39.7	12.6	63.6	113.3	51.9
29-Nov-91	1.2	1.857	219	30.5	3.9	11.5	3.8	11.5	3.8	18.5	34.0	45.6
30-Nov-91	1	1.547	142	23.9	3.3	9.8	3.2	9.8	3.2	15.7	29.2	37.2
01-Dec-91	1	1.547	142	23.9	3.3	9.8	3.2	9.8	3.2	15.7	29.2	28.4
02-Dec-91	0.9	1.392	140	26.1	3.5	10.7	3.5	10.7	3.5	17.3	31.7	16.8
03-Dec-91	0.9	1.392	144	26.9	3.6	11.0	3.6	11.0	3.6	17.6	32.4	16.6
04-Dec-91	1.2	1.857	145	20.5	3.0	8.3	2.8	8.3	2.8	13.4	25.3	16.0
05-Dec-91	2	3.094	497	41.2	5.0	13.3	4.3	13.3	4.3	21.4	39.0	17.4
06-Dec-91	2.5	3.868	1370	89.5	9.9	24.0	7.6	24.0	7.6	38.5	68.9	22.7
07-Dec-91	1.8	2.785	1610	145.5	15.5	37.9	12.0	37.9	12.0	60.7	108.3	33.5
08-Dec-91	1.4	2.166	1570	182.2	19.1	47.7	15.1	47.7	15.1	76.5	136.2	49.3
09-Dec-91	1.3	2.011	2300	286.9	29.6	69.9	22.1	69.9	22.1	111.9	199.1	71.9
10-Dec-91	1.1	1.702	2080	306.5	31.6	76.1	24.1	76.1	24.1	121.9	216.9	92.7
11-Dec-91	1.1	1.702	1310	193.4	20.2	52.5	16.6	52.5	16.6	84.1	149.8	98.6
12-Dec-91	1.1	1.702	1070	158.2	16.7	44.6	14.1	44.6	14.1	71.5	127.4	97.3
13-Dec-91	0.9	1.392	963	173.9	18.3	50.1	15.9	50.1	15.9	80.2	142.9	89.4
14-Dec-91	0.9	1.392	370	67.4	7.6	23.3	7.4	23.3	7.4	37.3	66.8	68.3
15-Dec-91	0.9	1.392	188	34.8	4.4	13.5	4.4	13.5	4.4	21.8	39.5	52.7
16-Dec-91	0.9	1.392	174	32.2	4.1	12.7	4.1	12.7	4.1	20.5	37.2	40.0
17-Dec-91	0.8	1.238	155	32.3	4.1	13.1	4.2	13.1	4.1	21.0	37.3	25.1
18-Dec-91	0.8	1.238	137	28.7	3.8	11.8	3.9	11.8	3.8	19.0	34.0	20.6
19-Dec-91	0.8	1.238	137	28.7	3.8	11.8	3.9	11.8	3.8	19.0	34.0	19.9
20-Dec-91	1	1.547	134	22.7	3.2	9.3	3.1	9.3	3.1	15.0	28.0	18.5
21-Dec-91	1.3	2.011	150	19.6	2.9	7.9	2.7	7.9	2.7	12.7	24.1	16.5
22-Dec-91	1	1.547	139	23.5	3.2	9.6	3.2	9.6	3.2	15.5	28.8	15.6
23-Dec-91	1	1.547	135	22.8	3.2	9.4	3.1	9.4	3.1	15.1	28.2	14.6
24-Dec-91	1	1.547	133	22.5	3.1	9.3	3.1	9.3	3.1	15.0	27.9	14.6
25-Dec-91	0.8	1.238	137	28.7	3.8	11.8	3.9	11.8	3.8	19.0	34.0	16.2
26-Dec-91	1	1.547	496	81.1	9.0	26.5	8.4	26.5	8.4	42.5	75.9	22.9
27-Dec-91	0.9	1.392	760	137.4	14.6	41.4	13.1	41.4	13.1	66.4	118.3	35.7
28-Dec-91	0.9	1.392	139	26.0	3.5	10.7	3.5	10.7	3.5	17.2	31.6	36.3
29-Dec-91	0.9	1.392	137	25.6	3.5	10.5	3.5	10.5	3.5	17.0	31.2	35.7
30-Dec-91	0.9	1.392	136	25.4	3.4	10.5	3.4	10.5	3.4	16.9	31.1	29.3
31-Dec-91	0.9	1.392	137	25.6	3.5	10.5	3.5	10.5	3.5	17.0	31.2	17.0
01-Jan-92	1	1.547	135	22.8	3.2	9.4	3.1	9.4	3.1	15.1	28.2	16.5
02-Jan-92	1.1	1.702	141	21.7	3.1	8.9	3.0	8.9	3.0	14.3	26.7	15.8
03-Jan-92	1.1	1.702	139	21.4	3.0	8.8	2.9	8.8	2.9	14.1	26.4	15.1
04-Jan-92	1.1	1.702	144	22.2	3.1	9.0	3.0	9.0	3.0	14.5	27.1	14.5
05-Jan-92	1	1.547	135	22.8	3.2	9.4	3.1	9.4	3.1	15.1	28.2	14.5
06-Jan-92	0.9	1.392	132	24.7	3.4	10.2	3.4	10.2	3.4	16.5	30.4	15.1
07-Jan-92	0.8	1.238	129	27.1	3.6	11.3	3.7	11.3	3.6	18.2	32.5	16.1
08-Jan-92	0.8	1.238	138	28.9	3.8	11.9	3.9	11.9	3.8	19.1	34.2	17.2
09-Jan-92	0.8	1.238	141	29.5	3.8	12.1	3.9	12.1	3.8	19.5	34.7	18.3
10-Jan-92	1.1	1.702	141	21.7	3.1	8.9	3.0	8.9	3.0	14.3	26.7	17.8
11-Jan-92	0.7	1.083	137	32.6	4.2	13.5	4.4	13.5	4.2	21.7	37.8	18.7
12-Jan-92	0.7	1.083	139	33.1	4.2	13.7	4.4	13.7	4.2	22.0	38.0	19.4
13-Jan-92	1.2	1.857	134	19.0	2.8	7.8	2.6	7.8	2.6	12.6	23.9	17.6
14-Jan-92	0.8	1.238	129	27.1	3.6	11.3	3.7	11.3	3.6	18.2	32.5	18.6
15-Jan-92	1.3	2.011	131	17.3	2.6	7.1	2.4	7.1	2.4	11.5	22.1	18.0
16-Jan-92	1.6	2.476	162	17.4	2.6	6.9	2.4	6.9	2.4	11.1	21.4	13.3
17-Jan-92	1.1	1.702	135	20.8	3.0	8.6	2.9	8.6	2.9	13.8	25.9	13.6
18-Jan-92	1	1.547	143	24.1	3.3	9.8	3.3	9.8	3.3	15.8	29.4	13.0
19-Jan-92	1	1.547	140	23.6	3.3	9.7	3.2	9.7	3.2	15.6	28.9	14.1
20-Jan-92	1	1.547	144	24.3	3.3	9.9	3.3	9.9	3.3	15.9	29.5	15.3
21-Jan-92	0.9	1.392	141	26.3	3.5	10.8	3.5	10.8	3.5	17.4	31.9	16.2
22-Jan-92	1.3	2.011	249	31.9	4.1	11.8	3.8	11.8	3.8	18.9	34.7	16.9
23-Jan-92	2	3.094	168	14.6	2.4	5.7	2.0	5.7	2.0	9.2	18.4	15.4
24-Jan-92	1.4	2.166	288	34.2	4.3	12.3	4.0	12.3	4.0	19.8	36.1	18.3
25-Jan-92	1.3	2.011	139	18.3	2.7	7.4	2.5	7.4	2.5	12.0	22.9	15.0
26-Jan-92	1.3	2.011	144	18.9	2.8	7.7	2.6	7.7	2.6	12.3	23.5	13.3
27-Jan-92	3.6	5.570	170	8.6	1.8	3.3	1.4	3.3	1.4	5.4	12.9	12.4
28-Jan-92	3.3	5.106	1110	55.4	6.4	15.4	5.0	15.4	5.0	24.7	44.7	13.6
29-Jan-92	2.9	4.487	2140	120.2	12.9	29.6	9.4	29.6	9.4	47.4	84.7	22.5
30-Jan-92	3.7	5.725	1980	87.5	9.6	21.8	7.0	21.8	7.0	35.0	62.8	28.1
31-Jan-92	1.6	2.476	1520	154.5	16.4	40.7	12.9	40.7	12.9	65.2	116.2	43.1
01-Feb-92	1.4	2.166	1270	147.6	15.7	40.2	12.8	40.2	12.8	64.5	115.0	53.0
02-Feb-92	1.3	2.011	1140	142.7	15.2	39.7	12.6	39.7	12.6	63.7	113.5	57.1
03-Feb-92	1.2	1.857	548	74.8	8.4	23.9	7.6	23.9	7.6	38.4	68.7	57.9
04-Feb-92	1	1.547	136	23.0	3.2	9.5	3.1	9.5	3.1	15.2	28.3	45.4
05-Feb-92	1	1.547	128	21.7	3.1	9.0	3.0	9.0	3.0	14.5	27.1	32.9
06-Feb-92	1	1.547	121	20.6	3.0	8.6	2.9	8.6	2.9	13.9	26.1	20.5
07-Feb-92	1	1.547	117	19.9	2.9	8.4	2.8	8.4	2.8	13.5	25.5	14.3
08-Feb-92	0.9	1.392	116	21.8	3.1	9.2	3.1	9.2	3.1	14.9	27.8	14.2

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation.)

				Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs):	River Discharge Rate at USGS 12100000 (cfs)	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
09-Feb-92	0.9	1.392	116	21.8	3.1	9.2	3.1	9.2	3.1	14.9	27.8	14.3
10-Feb-92	1	1.547	117	19.9	2.9	8.4	2.8	8.4	2.8	13.5	25.5	14.2
11-Feb-92	0.8	1.238	113	23.8	3.3	10.2	3.4	10.2	3.3	16.4	29.6	14.9
12-Feb-92	0.7	1.083	110	26.4	3.5	11.3	3.7	11.3	3.5	18.3	32.0	15.8
13-Feb-92	0.9	1.392	111	20.9	3.0	8.9	3.0	8.9	3.0	14.4	26.9	15.6
14-Feb-92	1.4	2.166	114	14.2	2.3	5.9	2.1	5.9	2.1	9.6	19.0	14.7
15-Feb-92	1.3	2.011	143	18.8	2.8	7.6	2.6	7.6	2.6	12.3	23.4	13.6
16-Feb-92	1.1	1.702	120	18.6	2.8	7.8	2.6	7.8	2.6	12.6	23.9	12.2
17-Feb-92	1	1.547	118	20.1	2.9	8.5	2.8	8.5	2.8	13.6	25.6	12.0
18-Feb-92	1.6	2.476	132	14.3	2.3	5.9	2.1	5.9	2.1	9.5	18.8	12.0
19-Feb-92	1.5	2.321	179	20.3	2.9	7.9	2.7	7.9	2.7	12.7	24.1	12.1
20-Feb-92	2	3.094	162	14.1	2.3	5.5	2.0	5.5	2.0	9.0	18.0	11.2
21-Feb-92	2.6	4.023	171	11.6	2.1	4.5	1.7	4.5	1.7	7.3	15.5	9.6
22-Feb-92	1.9	2.940	305	26.9	3.6	9.5	3.2	9.5	3.2	15.3	28.5	11.1
23-Feb-92	1.4	2.166	242	28.9	3.8	10.7	3.5	10.7	3.5	17.2	31.7	12.2
24-Feb-92	1.3	2.011	144	18.9	2.8	7.7	2.6	7.7	2.6	12.3	23.5	13.0
25-Feb-92	1.2	1.857	135	19.2	2.8	7.9	2.7	7.9	2.7	12.7	24.1	14.4
26-Feb-92	1	1.547	466	76.3	8.5	25.2	8.0	25.2	8.0	40.4	72.3	20.7
27-Feb-92	1	1.547	511	83.6	9.3	27.1	8.6	27.1	8.6	43.5	77.7	27.2
28-Feb-92	0.9	1.392	123	23.1	3.2	9.7	3.2	9.7	3.2	15.6	28.9	28.0
29-Feb-92	0.9	1.392	119	22.4	3.1	9.4	3.1	9.4	3.1	15.2	28.3	28.7
01-Mar-92	0.9	1.392	117	22.0	3.1	9.3	3.1	9.3	3.1	15.0	27.9	22.3
02-Mar-92	0.9	1.392	113	21.3	3.0	9.1	3.0	9.1	3.0	14.6	27.3	15.1
03-Mar-92	1	1.547	118	20.1	2.9	8.5	2.8	8.5	2.8	13.6	25.6	14.6
04-Mar-92	1	1.547	115	19.6	2.9	8.3	2.8	8.3	2.8	13.4	25.2	14.1
05-Mar-92	1	1.547	127	21.5	3.1	9.0	3.0	9.0	3.0	14.4	27.0	14.0
06-Mar-92	1	1.547	135	22.8	3.2	9.4	3.1	9.4	3.1	15.1	28.2	14.1
07-Mar-92	0.9	1.392	130	24.3	3.3	10.1	3.3	10.1	3.3	16.3	30.1	14.8
08-Mar-92	0.9	1.392	130	24.3	3.3	10.1	3.3	10.1	3.3	16.3	30.1	15.5
09-Mar-92	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	16.5
10-Mar-92	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	17.3
11-Mar-92	0.7	1.083	130	31.0	4.0	13.0	4.2	13.0	4.0	20.8	36.1	18.5
12-Mar-92	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	19.0
13-Mar-92	0.8	1.238	136	28.5	3.7	11.8	3.8	11.8	3.7	18.9	33.8	19.1
14-Mar-92	0.9	1.392	134	25.1	3.4	10.4	3.4	10.4	3.4	16.7	30.8	18.7
15-Mar-92	1.1	1.702	140	21.6	3.1	8.8	2.9	8.8	2.9	14.2	26.6	17.0
16-Mar-92	1.2	1.857	138	19.6	2.9	8.0	2.7	8.0	2.7	12.9	24.4	15.7
17-Mar-92	1.6	2.476	151	16.2	2.5	6.5	2.3	6.5	2.3	10.5	20.5	13.6
18-Mar-92	1.1	1.702	134	20.7	3.0	8.5	2.9	8.5	2.9	13.7	25.8	12.8
19-Mar-92	1	1.547	133	22.5	3.1	9.3	3.1	9.3	3.1	15.0	27.9	13.0
20-Mar-92	1	1.547	132	22.3	3.1	9.2	3.1	9.2	3.1	14.9	27.7	13.5
21-Mar-92	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	15.5
22-Mar-92	0.7	1.083	131	31.2	4.0	13.0	4.2	13.0	4.0	21.0	36.3	17.3
23-Mar-92	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	18.1
24-Mar-92	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	19.0
25-Mar-92	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	19.0
26-Mar-92	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	18.4
27-Mar-92	0.9	1.392	138	25.8	3.5	10.6	3.5	10.6	3.5	17.1	31.4	18.1
28-Mar-92	0.7	1.083	134	31.9	4.1	13.3	4.3	13.3	4.1	21.3	36.9	18.8
29-Mar-92	0.7	1.083	131	31.2	4.0	13.0	4.2	13.0	4.0	21.0	36.3	19.4
30-Mar-92	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	19.4
31-Mar-92	0.6	0.928	131	36.3	4.5	15.2	4.9	15.2	4.5	24.4	40.9	21.3
01-Apr-92	0.7	1.083	131	31.2	4.0	13.0	4.2	13.0	4.0	21.0	36.3	21.2
02-Apr-92	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	20.5
03-Apr-92	0.7	1.083	137	32.6	4.2	13.5	4.4	13.5	4.2	21.7	37.6	21.4
04-Apr-92	0.8	1.238	132	27.7	3.7	11.5	3.8	11.5	3.7	18.5	33.1	19.9
05-Apr-92	0.7	1.083	135	32.2	4.1	13.3	4.3	13.3	4.1	21.5	37.1	20.0
06-Apr-92	0.8	1.238	138	28.9	3.8	11.9	3.9	11.9	3.8	19.1	34.2	20.2
07-Apr-92	0.7	1.083	136	32.4	4.1	13.4	4.4	13.4	4.1	21.6	37.4	20.2
08-Apr-92	0.7	1.083	134	31.9	4.1	13.3	4.3	13.3	4.1	21.3	36.9	20.9
09-Apr-92	1.2	1.857	140	19.9	2.9	8.1	2.7	8.1	2.7	13.0	24.7	18.8
10-Apr-92	1	1.547	138	23.3	3.2	9.6	3.2	9.6	3.2	15.4	28.6	17.8
11-Apr-92	0.9	1.392	133	24.9	3.4	10.3	3.4	10.3	3.4	16.6	30.6	16.6
12-Apr-92	1	1.547	134	22.7	3.2	9.3	3.1	9.3	3.1	15.0	28.0	15.0
13-Apr-92	0.9	1.392	130	24.3	3.3	10.1	3.3	10.1	3.3	16.3	30.1	15.8
14-Apr-92	0.8	1.238	130	27.3	3.6	11.4	3.7	11.4	3.6	18.3	32.7	16.5
15-Apr-92	0.9	1.392	131	24.5	3.4	10.2	3.4	10.2	3.4	16.4	30.3	16.5
16-Apr-92	1.8	2.785	138	13.4	2.2	5.4	2.0	5.4	2.0	8.8	17.7	14.9
17-Apr-92	1.8	2.785	192	18.2	2.7	7.0	2.4	7.0	2.4	11.3	21.7	13.7
18-Apr-92	1.3	2.011	304	38.8	4.8	13.8	4.5	13.8	4.5	22.2	40.3	14.6
19-Apr-92	1.1	1.702	135	20.8	3.0	8.6	2.9	8.6	2.9	13.8	25.9	14.0
20-Apr-92	1.1	1.702	150	23.0	3.2	9.3	3.1	9.3	3.1	15.0	27.9	15.6
21-Apr-92	1	1.547	149	25.1	3.4	10.2	3.3	10.2	3.3	16.3	30.2	16.8
22-Apr-92	1	1.547	148	24.9	3.4	10.1	3.3	10.1	3.3	16.3	30.1	15.3
23-Apr-92	1	1.547	145	24.4	3.3	9.9	3.3	9.9	3.3	16.0	29.7	15.9
24-Apr-92	0.9	1.392	139	26.0	3.5	10.7	3.5	10.7	3.5	17.2	31.6	16.4
25-Apr-92	0.8	1.238	137	28.7	3.8	11.8	3.9	11.8	3.8	19.0	34.0	17.1
26-Apr-92	0.9	1.392	136	25.4	3.4	10.5	3.4	10.5	3.4	16.9	31.1	17.3
27-Apr-92	1	1.547	137	23.1	3.2	9.5	3.2	9.5	3.2	15.3	28.5	17.1
28-Apr-92	1	1.547	136	23.0	3.2	9.5	3.1	9.5	3.1	15.2	28.3	16.6
29-Apr-92	1.5	2.321	237	26.5	3.6	9.8	3.3	9.8	3.3	15.8	29.4	15.8
30-Apr-92	1.1	1.702	856	126.7	13.6	37.3	11.8	37.3	11.8	59.8	108.6	26.5

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

				Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L. WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs):	River Discharge Rate at USGS 12100000 (cfs)	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
01-Nov-92	1.5	2.321	149	17.1	2.6	6.8	2.4	6.8	2.4	11.0	21.4	
02-Nov-92	1.2	1.857	150	21.2	3.0	8.5	2.9	8.5	2.9	13.8	25.9	
03-Nov-92	1.2	1.857	136	19.3	2.8	7.9	2.7	7.9	2.7	12.8	24.2	
04-Nov-92	1.2	1.857	147	20.8	3.0	8.4	2.8	8.4	2.8	13.5	25.5	12.8
05-Nov-92	1.1	1.702	138	21.3	3.0	8.7	2.9	8.7	2.9	14.0	26.3	13.5
06-Nov-92	1.3	2.011	139	18.3	2.7	7.4	2.5	7.4	2.5	12.0	22.9	13.1
07-Nov-92	1.3	2.011	157	20.5	3.0	8.2	2.8	8.2	2.8	13.2	24.9	13.2
08-Nov-92	2.2	3.404	190	15.0	2.4	5.7	2.0	5.7	2.0	9.2	18.5	12.1
09-Nov-92	1.5	2.321	208	23.4	3.2	8.9	3.0	8.9	3.0	14.3	26.8	12.2
10-Nov-92	1.3	2.011	162	21.1	3.0	8.4	2.8	8.4	2.8	13.5	25.5	12.6
11-Nov-92	2.2	3.404	225	17.5	2.7	6.5	2.3	6.5	2.3	10.5	20.5	11.9
12-Nov-92	1.5	2.321	338	37.4	4.6	13.0	4.2	13.0	4.2	20.9	38.2	14.8
13-Nov-92	1.3	2.011	166	21.6	3.1	8.6	2.9	8.6	2.9	13.8	25.9	14.7
14-Nov-92	1.2	1.857	156	22.0	3.1	8.8	2.9	8.8	2.9	14.2	26.6	14.9
15-Nov-92	1.2	1.857	146	20.7	3.0	8.4	2.8	8.4	2.8	13.5	25.4	15.6
16-Nov-92	1.1	1.702	144	22.2	3.1	9.0	3.0	9.0	3.0	14.5	27.1	14.0
17-Nov-92	2	3.094	153	13.4	2.2	5.3	1.9	5.3	1.9	8.6	17.4	12.7
18-Nov-92	2	3.094	165	14.3	2.3	5.6	2.0	5.6	2.0	9.1	18.2	11.4
19-Nov-92	1.9	2.940	182	16.5	2.5	6.4	2.2	6.4	2.2	10.3	20.1	10.6
20-Nov-92	1.4	2.166	166	20.2	2.9	8.0	2.7	8.0	2.7	12.8	24.3	10.2
21-Nov-92	3.2	4.951	554	29.0	3.8	9.1	3.0	9.1	3.0	14.7	27.5	11.7
22-Nov-92	1.9	2.940	1300	111.6	12.1	30.2	9.6	30.2	9.6	48.5	86.6	21.6
23-Nov-92	1.5	2.321	446	49.0	5.8	16.2	5.2	16.2	5.2	26.1	47.1	25.5
24-Nov-92	1.3	2.011	172	22.4	3.1	8.8	2.9	8.8	2.9	14.2	26.5	25.9
25-Nov-92	1.2	1.857	157	22.1	3.1	8.9	3.0	8.9	3.0	14.3	26.7	25.8
26-Nov-92	1.2	1.857	149	21.1	3.0	8.5	2.8	8.5	2.8	13.7	25.7	17.1
27-Nov-92	1.5	2.321	159	18.1	2.7	7.2	2.5	7.2	2.5	11.6	22.3	13.4
28-Nov-92	1.3	2.011	153	20.0	2.9	8.0	2.7	8.0	2.7	12.9	24.5	13.1
29-Nov-92	1.6	2.476	139	15.0	2.4	6.1	2.1	6.1	2.1	9.8	19.4	12.0
30-Nov-92	1.8	2.785	178	17.0	2.6	6.6	2.3	6.6	2.3	10.6	20.7	11.3
01-Dec-92	1.4	2.166	153	18.7	2.8	7.5	2.5	7.5	2.5	12.0	23.0	11.4
02-Dec-92	1.2	1.857	141	20.0	2.9	8.1	2.7	8.1	2.7	13.1	24.8	11.4
03-Dec-92	1.2	1.857	134	19.0	2.8	7.8	2.6	7.8	2.6	12.6	23.9	12.1
04-Dec-92	1.1	1.702	133	20.5	3.0	8.5	2.8	8.5	2.8	13.6	25.6	12.9
05-Dec-92	1.1	1.702	129	19.9	2.9	8.3	2.8	8.3	2.8	13.3	25.1	13.2
06-Dec-92	1.1	1.702	130	20.1	2.9	8.3	2.8	8.3	2.8	13.4	25.2	13.2
07-Dec-92	1.1	1.702	131	20.2	2.9	8.4	2.8	8.4	2.8	13.5	25.4	13.5
08-Dec-92	1.2	1.857	133	18.9	2.8	7.8	2.6	7.8	2.6	12.5	23.8	13.2
09-Dec-92	1.3	2.011	133	17.5	2.7	7.2	2.5	7.2	2.5	11.6	22.3	12.8
10-Dec-92	2.1	3.249	146	12.2	2.1	4.9	1.8	4.9	1.8	7.9	16.4	11.4
11-Dec-92	1.8	2.785	140	13.6	2.3	5.5	2.0	5.5	2.0	8.9	17.9	10.2
12-Dec-92	1.6	2.476	137	14.8	2.4	6.0	2.1	6.0	2.1	9.7	19.3	9.5
13-Dec-92	1.6	2.476	133	14.4	2.3	5.9	2.1	5.9	2.1	9.5	18.9	9.0
14-Dec-92	2	3.094	189	16.3	2.5	6.2	2.2	6.2	2.2	10.1	19.8	9.5
15-Dec-92	1.7	2.630	159	16.1	2.5	6.4	2.2	6.4	2.2	10.3	20.1	9.9
16-Dec-92	1.6	2.476	140	15.1	2.4	6.1	2.2	6.1	2.2	9.9	19.5	9.9
17-Dec-92	1.6	2.476	137	14.8	2.4	6.0	2.1	6.0	2.1	9.7	19.3	10.0
18-Dec-92	1.4	2.166	129	15.9	2.5	6.5	2.3	6.5	2.3	10.6	20.6	10.1
19-Dec-92	2.2	3.404	139	11.2	2.0	4.5	1.7	4.5	1.7	7.3	15.5	9.4
20-Dec-92	2.5	3.868	214	14.8	2.4	5.5	2.0	5.5	2.0	9.0	18.0	9.1
21-Dec-92	2.2	3.404	158	12.6	2.2	5.0	1.8	5.0	1.8	8.0	16.6	8.7
22-Dec-92	1.7	2.630	129	13.3	2.2	5.4	2.0	5.4	2.0	8.8	17.8	8.3
23-Dec-92	1.6	2.476	133	14.4	2.3	5.9	2.1	5.9	2.1	9.5	18.9	8.8
24-Dec-92	1.6	2.476	129	14.0	2.3	5.8	2.1	5.8	2.1	9.3	18.6	8.9
25-Dec-92	1.5	2.321	128	14.8	2.4	6.1	2.1	6.1	2.1	9.8	19.4	9.4
26-Dec-92	1.5	2.321	129	14.9	2.4	6.1	2.2	6.1	2.2	9.9	19.5	9.6
27-Dec-92	1.5	2.321	128	14.8	2.4	6.1	2.1	6.1	2.1	9.8	19.4	9.7
28-Dec-92	1.6	2.476	128	13.9	2.3	5.7	2.0	5.7	2.0	9.2	18.5	9.7
29-Dec-92	1.5	2.321	128	14.8	2.4	6.1	2.1	6.1	2.1	9.8	19.4	9.7
30-Dec-92	1.4	2.166	129	15.9	2.5	6.5	2.3	6.5	2.3	10.6	20.6	9.9
31-Dec-92	1.4	2.166	131	16.1	2.5	6.6	2.3	6.6	2.3	10.7	20.8	10.1
01-Jan-93	1.3	2.011	132	17.4	2.6	7.1	2.5	7.1	2.5	11.5	22.2	10.7
02-Jan-93	1.4	2.166	130	16.0	2.5	6.6	2.3	6.6	2.3	10.6	20.7	10.9
03-Jan-93	1.5	2.321	133	15.3	2.4	6.3	2.2	6.3	2.2	10.1	19.9	10.7
04-Jan-93	1.5	2.321	130	15.0	2.4	6.2	2.2	6.2	2.2	9.9	19.6	10.6
05-Jan-93	1.4	2.166	129	15.9	2.5	6.5	2.3	6.5	2.3	10.6	20.6	10.3
06-Jan-93	1.4	2.166	134	16.5	2.5	6.7	2.3	6.7	2.3	10.9	21.1	10.4
07-Jan-93	1.4	2.166	146	17.9	2.7	7.2	2.5	7.2	2.5	11.6	22.3	10.7
08-Jan-93	1.4	2.166	130	16.0	2.5	6.6	2.3	6.6	2.3	10.6	20.7	10.9
09-Jan-93	1.3	2.011	449	56.8	6.6	18.8	6.0	18.8	6.0	30.2	54.4	15.8
10-Jan-93	1.4	2.166	502	58.9	6.8	19.1	6.1	19.1	6.1	30.7	55.2	20.8
11-Jan-93	1.4	2.166	377	44.5	5.4	15.2	4.9	15.2	4.9	24.4	44.2	24.0
12-Jan-93	1.4	2.166	320	37.9	4.7	13.4	4.3	13.4	4.3	21.5	39.1	26.7
13-Jan-93	1.4	2.166	479	56.3	6.5	18.4	5.9	18.4	5.9	29.6	53.2	26.5
14-Jan-93	1.4	2.166	529	62.1	7.1	19.9	6.4	19.9	6.4	32.0	57.5	28.9
15-Jan-93	1.3	2.011	539	68.0	7.7	21.8	7.0	21.8	7.0	35.0	62.7	29.5
16-Jan-93	1.3	2.011	483	61.0	7.0	20.0	6.4	20.0	6.4	32.0	57.6	32.1
17-Jan-93	1.4	2.166	322	38.2	4.7	13.4	4.3	13.4	4.3	21.6	39.2	30.1
18-Jan-93	1.3	2.011	210	27.1	3.6	10.3	3.4	10.3	3.4	16.6	30.6	26.3
19-Jan-93	1.5	2.321	156	17.8	2.7	7.1	2.4	7.1	2.4	11.4	22.0	20.4
20-Jan-93	1.2	1.857	170	23.9	3.3	9.4	3.1	9.4	3.1	15.2	28.2	16.2
21-Jan-93	1.3	2.011	163	21.3	3.0	8.4	2.8	8.4	2.8	13.8	25.6	14.2
22-Jan-93	1.7	2.630	136	13.9	2.3	5.7	2.0	5.7	2.0	9.1	18.3	12.3

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs):	River Discharge Rate at USGS 12100000 (cfs)	Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs: Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
				Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
23-Jan-93	1.5	2.321	134	15.4	2.4	6.3	2.2	6.3	2.2	10.2	20.0	12.0
24-Jan-93	2.5	3.868	143	10.2	1.9	4.1	1.6	4.1	1.6	6.6	14.5	9.9
25-Jan-93	3.4	5.260	2020	97.0	10.6	24.1	7.7	24.1	7.7	38.7	69.2	16.2
26-Jan-93	3	4.642	2680	145.3	15.4	34.3	10.9	34.3	10.9	54.9	98.0	27.6
27-Jan-93	2	3.094	1420	115.7	12.5	30.8	9.8	30.8	9.8	49.4	88.3	37.4
28-Jan-93	1.8	2.785	890	80.9	9.0	23.6	7.5	23.6	7.5	37.8	67.7	45.2
29-Jan-93	1.6	2.476	700	71.7	8.1	21.9	7.0	21.9	7.0	35.1	62.9	44.3
30-Jan-93	1.8	2.476	588	60.4	6.9	19.0	6.1	19.0	6.1	30.5	54.9	38.2
31-Jan-93	1.5	2.321	539	59.1	6.8	18.9	6.1	18.9	6.1	30.3	54.6	33.4
01-Feb-93	1.5	2.321	488	53.6	6.3	17.5	5.6	17.5	5.6	28.0	50.5	31.0
02-Feb-93	1.4	2.166	427	50.3	5.9	16.8	5.4	16.8	5.4	27.0	48.7	29.0
03-Feb-93	1.4	2.166	392	46.2	5.5	15.7	5.1	15.7	5.1	25.2	45.6	27.6
04-Feb-93	1.4	2.166	371	43.8	5.3	15.0	4.8	15.0	4.8	24.1	43.7	26.1
05-Feb-93	1.4	2.166	370	43.7	5.3	15.0	4.8	15.0	4.8	24.1	43.6	25.1
06-Feb-93	1.4	2.166	367	43.4	5.2	14.9	4.8	14.9	4.8	23.9	43.3	24.3
07-Feb-93	1.4	2.166	410	48.3	5.7	16.3	5.2	16.3	5.2	26.1	47.2	24.6
08-Feb-93	1.4	2.166	606	70.9	8.0	22.2	7.1	22.2	7.1	35.7	64.0	27.5
09-Feb-93	1.4	2.166	1120	130.3	13.9	36.4	11.5	36.4	11.5	58.3	104.0	36.0
10-Feb-93	1.4	2.166	1110	129.1	13.8	36.1	11.5	36.1	11.5	57.9	103.3	44.5
11-Feb-93	1.5	2.321	1080	117.3	12.6	33.0	10.5	33.0	10.5	52.9	94.4	51.2
12-Feb-93	1.4	2.166	919	107.1	11.6	31.0	9.9	31.0	9.9	49.8	88.9	54.7
13-Feb-93	1.4	2.166	274	32.6	4.2	11.8	3.9	11.8	3.9	19.0	34.8	44.9
14-Feb-93	1.4	2.166	132	16.2	2.5	6.7	2.3	6.7	2.3	10.7	20.9	33.1
15-Feb-93	1.4	2.166	131	16.1	2.5	6.6	2.3	6.6	2.3	10.7	20.8	22.5
16-Feb-93	1.4	2.166	129	15.9	2.5	6.5	2.3	6.5	2.3	10.6	20.6	12.7
17-Feb-93	1.4	2.166	133	16.4	2.5	6.7	2.3	6.7	2.3	10.8	21.0	10.7
18-Feb-93	1.4	2.166	136	16.7	2.6	6.8	2.4	6.8	2.4	11.0	21.3	10.8
19-Feb-93	1.3	2.011	141	18.5	2.8	7.5	2.6	7.5	2.6	12.1	23.2	11.1
20-Feb-93	1.4	2.166	138	16.9	2.6	6.9	2.4	6.9	2.4	11.1	21.5	11.3
21-Feb-93	1.3	2.011	131	17.3	2.6	7.1	2.4	7.1	2.4	11.5	22.1	11.4
22-Feb-93	1.2	1.857	131	18.6	2.8	7.7	2.6	7.7	2.6	12.4	23.6	11.8
23-Feb-93	1.2	1.857	133	18.9	2.8	7.8	2.6	7.8	2.6	12.5	23.8	11.9
24-Feb-93	1.3	2.011	133	17.5	2.7	7.2	2.5	7.2	2.5	11.6	22.3	12.0
25-Feb-93	1.4	2.166	133	16.4	2.5	6.7	2.3	6.7	2.3	10.8	21.0	11.8
26-Feb-93	1.3	2.011	137	18.0	2.7	7.4	2.5	7.4	2.5	11.9	22.7	11.7
27-Feb-93	1.3	2.011	134	17.7	2.7	7.2	2.5	7.2	2.5	11.7	22.4	11.5
28-Feb-93	1.4	2.166	138	16.9	2.6	6.9	2.4	6.9	2.4	11.1	21.5	11.4
01-Mar-93	1.3	2.011	135	17.8	2.7	7.3	2.5	7.3	2.5	11.7	22.5	11.6
02-Mar-93	1.4	2.166	131	16.1	2.5	6.6	2.3	6.6	2.3	10.7	20.8	11.3
03-Mar-93	1.4	2.166	140	17.2	2.6	7.0	2.4	7.0	2.4	11.2	21.7	11.2
04-Mar-93	1.5	2.321	134	15.4	2.4	6.3	2.2	6.3	2.2	10.2	20.0	11.0
05-Mar-93	1.4	2.166	129	15.9	2.5	6.5	2.3	6.5	2.3	10.6	20.6	10.7
06-Mar-93	1.4	2.166	133	16.4	2.5	6.7	2.3	6.7	2.3	10.8	21.0	10.7
07-Mar-93	1.3	2.011	127	16.8	2.6	6.9	2.4	6.9	2.4	11.2	21.6	10.7
08-Mar-93	1.4	2.166	133	16.4	2.5	6.7	2.3	6.7	2.3	10.8	21.0	10.8
09-Mar-93	1.4	2.166	131	16.1	2.5	6.6	2.3	6.6	2.3	10.7	20.8	10.9
10-Mar-93	1.3	2.011	128	16.9	2.6	7.0	2.4	7.0	2.4	11.3	21.7	11.0
11-Mar-93	1.3	2.011	128	16.9	2.6	7.0	2.4	7.0	2.4	11.3	21.7	11.0
12-Mar-93	1.3	2.011	130	17.2	2.6	7.1	2.4	7.1	2.4	11.4	21.9	11.2
13-Mar-93	1.2	1.857	129	18.4	2.7	7.6	2.6	7.6	2.6	12.2	23.3	11.5
14-Mar-93	1.6	2.476	142	15.3	2.4	6.2	2.2	6.2	2.2	10.0	19.7	11.2
15-Mar-93	1.5	2.321	770	83.9	9.3	25.1	8.0	25.1	8.0	40.3	72.2	18.5
16-Mar-93	0.7	1.083	394	91.9	10.1	31.4	10.0	31.4	10.0	50.4	89.9	28.2
17-Mar-93	1.3	2.011	172	22.4	3.1	8.8	2.9	8.8	2.9	14.2	26.5	28.7
18-Mar-93	0.8	1.238	155	32.3	4.1	13.1	4.2	13.1	4.1	21.0	37.3	31.5
19-Mar-93	0.7	1.083	137	32.6	4.2	13.5	4.4	13.5	4.2	21.7	37.6	26.8
20-Mar-93	0.7	1.083	128	30.5	4.0	12.8	4.2	12.8	4.0	20.6	35.7	19.4
21-Mar-93	1.6	2.476	127	13.8	2.3	5.7	2.0	5.7	2.0	9.2	18.4	18.1
22-Mar-93	2.9	4.487	232	13.9	2.3	5.1	1.9	5.1	1.9	8.3	17.0	14.9
23-Mar-93	2.5	3.868	2190	142.5	15.2	35.0	11.1	35.0	11.1	56.0	99.9	23.5
24-Mar-93	1.5	2.321	1450	157.2	16.6	41.8	13.2	41.8	13.2	67.0	119.3	35.1
25-Mar-93	1.1	1.702	518	77.1	8.6	24.9	7.9	24.9	7.9	40.0	71.6	42.8
26-Mar-93	1	1.547	159	26.7	3.6	10.7	3.5	10.7	3.5	17.2	31.7	45.0
27-Mar-93	0.6	0.928	137	37.9	4.7	15.7	5.1	15.7	4.7	25.3	42.3	37.4
28-Mar-93	0.7	1.083	140	33.3	4.2	13.7	4.4	13.7	4.2	22.1	38.2	26.1
29-Mar-93	0.6	0.928	132	36.5	4.6	15.3	4.9	15.3	4.6	24.5	41.1	22.3
30-Mar-93	0.7	1.083	134	31.9	4.1	13.3	4.3	13.3	4.1	21.3	36.9	23.3
31-Mar-93	0.7	1.083	129	30.8	4.0	12.9	4.2	12.9	4.0	20.7	35.9	22.2
01-Apr-93	0.9	1.392	136	25.4	3.4	10.5	3.4	10.5	3.4	16.9	31.1	20.9
02-Apr-93	1	1.547	137	23.1	3.2	9.5	3.2	9.5	3.2	15.3	28.5	18.6
03-Apr-93	1.5	2.321	156	17.8	2.7	7.1	2.4	7.1	2.4	11.4	22.0	16.1
04-Apr-93	1	1.547	141	23.8	3.3	9.7	3.2	9.7	3.2	15.7	29.1	14.8
05-Apr-93	0.8	1.238	130	27.3	3.6	11.4	3.7	11.4	3.6	18.3	32.7	15.2
06-Apr-93	0.9	1.392	133	24.9	3.4	10.3	3.4	10.3	3.4	16.6	30.6	15.5
07-Apr-93	0.8	1.238	130	27.3	3.6	11.4	3.7	11.4	3.6	18.3	32.7	17.2
08-Apr-93	1.3	2.011	136	17.9	2.7	7.3	2.5	7.3	2.5	11.8	22.6	16.2
09-Apr-93	1.6	2.476	244	25.6	3.5	9.4	3.1	9.4	3.1	15.2	28.3	15.5
10-Apr-93	1.3	2.011	160	20.9	3.0	8.3	2.8	8.3	2.8	13.4	25.2	14.7
11-Apr-93	1.3	2.011	153	20.0	2.9	8.0	2.7	8.0	2.7	12.9	24.5	13.3
12-Apr-93	1	1.547	145	24.4	3.3	9.9	3.3	9.9	3.3	16.0	29.7	14.4
13-Apr-93	0.9	1.392	136	25.4	3.4	10.5	3.4	10.5	3.4	16.9	31.1	14.8
14-Apr-93	0.7	1.083	130	31.0	4.0	13.0	4.2	13.0	4.0	20.8	36.1	16.7
15-Apr-93	0.7	1.083	132	31.5	4.0	13.1	4.3	13.1	4.0	21.1	36.5	18.7

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

				Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox, 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs):	River Discharge Rate at USGS 12100000 (cfs)	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
16-Apr-93	1.1	1.702	1070	158.2	16.7	44.6	14.1	44.6	14.1	71.5	127.4	32.6
17-Apr-93	1.1	1.702	164	25.1	3.4	10.0	3.3	10.0	3.3	16.1	29.7	32.4
18-Apr-93	1	1.547	136	23.0	3.2	9.5	3.1	9.5	3.1	15.2	28.3	31.0
19-Apr-93	0.8	1.238	135	28.3	3.7	11.7	3.8	11.7	3.7	18.8	33.6	30.4
20-Apr-93	0.7	1.083	129	30.8	4.0	12.9	4.2	12.9	4.0	20.7	35.9	17.7
21-Apr-93	0.8	1.238	130	27.3	3.6	11.4	3.7	11.4	3.6	18.3	32.7	18.3
22-Apr-93	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	19.0
23-Apr-93	0.8	1.238	131	27.5	3.6	11.4	3.7	11.4	3.6	18.4	32.9	18.9
24-Apr-93	0.9	1.392	139	26.0	3.5	10.7	3.5	10.7	3.5	17.2	31.6	18.0
25-Apr-93	1.1	1.702	142	21.9	3.1	8.9	3.0	8.9	3.0	14.4	26.8	17.1
26-Apr-93	1.4	2.166	143	17.5	2.7	7.1	2.4	7.1	2.4	11.4	22.0	15.3
27-Apr-93	1.2	1.857	151	21.3	3.0	8.6	2.9	8.6	2.9	13.8	26.0	14.2
28-Apr-93	1	1.547	131	22.2	3.1	9.2	3.1	9.2	3.1	14.8	27.6	13.6
29-Apr-93	1.3	2.011	153	20.0	2.9	8.0	2.7	8.0	2.7	12.9	24.5	13.2
30-Apr-93	1.2	1.857	193	27.0	3.6	10.4	3.4	10.4	3.4	16.8	30.9	14.6
01-Nov-93	1	1.547	132	22.3	3.1	9.2	3.1	9.2	3.1	14.9	27.7	
02-Nov-93	1	1.547	130	22.0	3.1	9.1	3.0	9.1	3.0	14.7	27.4	
03-Nov-93	1	1.547	140	23.6	3.3	9.7	3.2	9.7	3.2	15.6	28.9	
04-Nov-93	1	1.547	133	22.5	3.1	9.3	3.1	9.3	3.1	15.0	27.9	15.0
05-Nov-93	1	1.547	131	22.2	3.1	9.2	3.1	9.2	3.1	14.8	27.6	15.0
06-Nov-93	1	1.547	130	22.0	3.1	9.1	3.0	9.1	3.0	14.7	27.4	15.0
07-Nov-93	1.1	1.702	130	20.1	2.9	8.3	2.8	8.3	2.8	13.4	25.2	14.5
08-Nov-93	1	1.547	132	22.3	3.1	9.2	3.1	9.2	3.1	14.9	27.7	14.4
09-Nov-93	1	1.547	134	22.7	3.2	9.3	3.1	9.3	3.1	15.0	28.0	14.5
10-Nov-93	1	1.547	132	22.3	3.1	9.2	3.1	9.2	3.1	14.9	27.7	14.5
11-Nov-93	1	1.547	131	22.2	3.1	9.2	3.1	9.2	3.1	14.8	27.6	14.9
12-Nov-93	2	3.094	133	11.7	2.1	4.8	1.8	4.8	1.8	7.7	16.1	13.1
13-Nov-93	1	1.547	133	22.5	3.1	9.3	3.1	9.3	3.1	15.0	27.9	13.1
14-Nov-93	0.9	1.392	131	24.5	3.4	10.2	3.4	10.2	3.4	16.4	30.3	13.5
15-Nov-93	1	1.547	132	22.3	3.1	9.2	3.1	9.2	3.1	14.9	27.7	13.5
16-Nov-93	1	1.547	134	22.7	3.2	9.3	3.1	9.3	3.1	15.0	28.0	15.3
17-Nov-93	1.1	1.702	130	20.1	2.9	8.3	2.8	8.3	2.8	13.4	25.2	14.9
18-Nov-93	1	1.547	133	22.5	3.1	9.3	3.1	9.3	3.1	15.0	27.9	14.6
19-Nov-93	1	1.547	131	22.2	3.1	9.2	3.1	9.2	3.1	14.8	27.6	14.5
20-Nov-93	0.9	1.392	131	24.5	3.4	10.2	3.4	10.2	3.4	16.4	30.3	14.9
21-Nov-93	1	1.547	136	23.0	3.2	9.5	3.1	9.5	3.1	15.2	28.3	15.3
22-Nov-93	1	1.547	197	32.8	4.2	12.7	4.1	12.7	4.1	20.4	37.2	16.7
23-Nov-93	1	1.547	133	22.5	3.1	9.3	3.1	9.3	3.1	15.0	27.9	16.7
24-Nov-93	1	1.547	136	23.0	3.2	9.5	3.1	9.5	3.1	15.2	28.3	16.4
25-Nov-93	1	1.547	146	24.6	3.4	10.0	3.3	10.0	3.3	16.1	29.8	16.7
26-Nov-93	1	1.547	134	22.7	3.2	9.3	3.1	9.3	3.1	15.0	28.0	15.3
27-Nov-93	1.1	1.702	134	20.7	3.0	8.5	2.9	8.5	2.9	13.7	25.6	15.0
28-Nov-93	1.2	1.857	133	18.9	2.8	7.8	2.6	7.8	2.6	12.5	23.8	14.3
29-Nov-93	1.3	2.011	139	18.3	2.7	7.4	2.5	7.4	2.5	12.0	22.9	13.3
30-Nov-93	1.3	2.011	135	17.8	2.7	7.3	2.5	7.3	2.5	11.7	22.5	12.5
01-Dec-93	1.5	2.321	379	41.8	5.1	14.3	4.6	14.3	4.6	22.9	41.6	14.8
02-Dec-93	1.4	2.166	452	53.2	6.2	17.6	5.6	17.6	5.6	28.2	50.9	18.7
03-Dec-93	1.4	2.166	135	16.6	2.6	6.8	2.3	6.8	2.3	10.9	21.2	18.5
04-Dec-93	1.3	2.011	129	17.0	2.6	7.0	2.4	7.0	2.4	11.3	21.8	18.4
05-Dec-93	1.2	1.857	131	18.6	2.8	7.7	2.6	7.7	2.6	12.4	23.6	15.7
06-Dec-93	1.2	1.857	133	18.9	2.8	7.8	2.6	7.8	2.6	12.5	23.8	11.8
07-Dec-93	1.3	2.011	130	17.2	2.6	7.1	2.4	7.1	2.4	11.4	21.9	11.9
08-Dec-93	1.4	2.166	130	16.0	2.5	6.6	2.3	6.6	2.3	10.6	20.7	11.7
09-Dec-93	1.3	2.011	131	17.3	2.6	7.1	2.4	7.1	2.4	11.5	22.1	11.5
10-Dec-93	1.3	2.011	140	18.4	2.7	7.5	2.5	7.5	2.5	12.1	23.0	11.4
11-Dec-93	1.3	2.011	137	18.0	2.7	7.4	2.5	7.4	2.5	11.9	22.7	11.5
12-Dec-93	1.4	2.166	132	16.2	2.5	6.7	2.3	6.7	2.3	10.7	20.9	11.5
13-Dec-93	1.3	2.011	132	17.4	2.6	7.1	2.5	7.1	2.5	11.5	22.2	11.6
14-Dec-93	1.2	1.857	132	18.8	2.8	7.7	2.6	7.7	2.6	12.5	23.7	11.7
15-Dec-93	1.2	1.857	130	18.5	2.8	7.6	2.6	7.6	2.6	12.3	23.4	11.8
16-Dec-93	1.2	1.857	129	18.4	2.7	7.6	2.6	7.6	2.6	12.2	23.3	12.1
17-Dec-93	1.1	1.702	129	19.9	2.9	8.3	2.8	8.3	2.8	13.3	25.1	12.6
18-Dec-93	1.1	1.702	129	19.9	2.9	8.3	2.8	8.3	2.8	13.3	25.1	12.8
19-Dec-93	1.1	1.702	131	20.2	2.9	8.4	2.8	8.4	2.8	13.5	25.4	13.1
20-Dec-93	1.1	1.702	140	21.6	3.1	8.8	2.9	8.8	2.9	14.2	26.6	13.6
21-Dec-93	1.1	1.702	139	21.4	3.0	8.8	2.9	8.8	2.9	14.1	26.4	13.8
22-Dec-93	0.6	0.928	134	37.1	4.6	15.5	5.0	15.5	4.6	24.8	41.6	16.7
23-Dec-93	0.7	1.083	137	32.6	4.2	13.5	4.4	13.5	4.2	21.7	37.6	18.7
24-Dec-93	0.7	1.083	141	33.5	4.3	13.8	4.5	13.8	4.3	22.2	38.4	20.7
25-Dec-93	0.6	0.928	134	37.1	4.6	15.5	5.0	15.5	4.8	24.8	41.6	23.4
26-Dec-93	0.7	1.083	132	31.5	4.0	13.1	4.3	13.1	4.0	21.1	36.5	22.5
27-Dec-93	0.7	1.083	133	31.7	4.1	13.2	4.3	13.2	4.1	21.2	36.7	22.3
28-Dec-93	0.6	0.928	135	37.4	4.6	15.5	5.0	15.5	4.6	25.0	41.8	23.0
29-Dec-93	0.6	0.928	136	37.6	4.7	15.6	5.0	15.6	4.7	25.1	42.1	23.1
30-Dec-93	1	1.547	134	22.7	3.2	9.3	3.1	9.3	3.1	15.0	28.0	21.5
31-Dec-93	1.3	2.011	141	18.5	2.8	7.5	2.6	7.5	2.6	12.1	23.2	19.3
01-Jan-94	1.2	1.857	176	24.7	3.4	9.7	3.2	9.7	3.2	15.6	29.0	17.0
02-Jan-94	1.5	2.321	155	17.7	2.7	7.1	2.4	7.1	2.4	11.4	21.9	13.5
03-Jan-94	1.6	2.475	153	16.5	2.5	6.6	2.3	6.6	2.3	10.6	20.6	12.4
04-Jan-94	1.9	2.940	182	16.5	2.5	6.4	2.2	6.4	2.2	10.3	20.1	12.0
05-Jan-94	1.8	2.785	236	22.2	3.1	8.2	2.8	8.2	2.8	13.2	25.0	11.4
06-Jan-94	1.4	2.166	145	17.7	2.7	7.2	2.5	7.2	2.5	11.6	22.2	11.4

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation.)

Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs)	River Discharge Rate at USGS 12100000 (cfs)	Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox, 1995; Fischer et al., 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs: Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
				Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
07-Jan-94	1.6	2.476	140	15.1	2.4	6.1	2.2	6.1	2.2	9.9	19.5	11.2
08-Jan-94	1.5	2.321	146	16.7	2.6	6.7	2.3	6.7	2.3	10.9	21.1	11.4
09-Jan-94	1.4	2.166	142	17.4	2.6	7.0	2.4	7.0	2.4	11.4	21.9	10.9
10-Jan-94	1.8	2.785	146	14.1	2.3	5.7	2.0	5.7	2.0	9.1	18.3	10.3
11-Jan-94	1.5	2.321	166	18.9	2.8	7.4	2.5	7.4	2.5	12.0	22.9	10.8
12-Jan-94	1.8	2.785	201	19.0	2.8	7.2	2.5	7.2	2.5	11.7	22.4	11.0
13-Jan-94	1.6	2.476	517	53.2	6.2	17.1	5.5	17.1	5.5	27.5	49.6	15.1
14-Jan-94	1.5	2.321	418	46.0	5.5	15.4	5.0	15.4	5.0	24.8	44.8	19.0
15-Jan-94	1.3	2.011	152	19.9	2.9	8.0	2.7	8.0	2.7	12.9	24.4	19.2
16-Jan-94	1.3	2.011	135	17.8	2.7	7.3	2.5	7.3	2.5	11.7	22.5	19.2
17-Jan-94	1.3	2.011	139	18.3	2.7	7.4	2.5	7.4	2.5	12.0	22.9	15.4
18-Jan-94	1.2	1.857	134	19.0	2.8	7.8	2.6	7.8	2.6	12.6	23.9	12.3
19-Jan-94	1.2	1.857	134	19.0	2.8	7.8	2.6	7.8	2.6	12.6	23.9	12.2
20-Jan-94	1.1	1.702	135	20.8	3.0	8.6	2.9	8.6	2.9	13.8	25.9	12.8
21-Jan-94	1.2	1.857	131	18.6	2.8	7.7	2.6	7.7	2.6	12.4	23.6	12.9
22-Jan-94	1.5	2.321	136	15.7	2.5	6.4	2.2	6.4	2.2	10.3	20.1	12.3
23-Jan-94	1.7	2.630	140	14.3	2.3	5.8	2.1	5.8	2.1	9.3	18.6	11.5
24-Jan-94	1.7	2.630	137	14.0	2.3	5.7	2.0	5.7	2.0	9.2	18.4	10.3
25-Jan-94	1.6	2.476	141	15.2	2.4	6.2	2.2	6.2	2.2	10.0	19.6	9.7
26-Jan-94	1.4	2.166	138	16.9	2.6	6.9	2.4	6.9	2.4	11.1	21.5	9.9
27-Jan-94	1.4	2.166	134	16.5	2.5	6.7	2.3	6.7	2.3	10.9	21.1	10.3
28-Jan-94	1.2	1.857	139	19.7	2.9	8.0	2.7	8.0	2.7	13.0	24.5	11.2
29-Jan-94	1.2	1.857	135	19.2	2.8	7.9	2.7	7.9	2.7	12.7	24.1	11.9
30-Jan-94	1.2	1.857	135	19.2	2.8	7.9	2.7	7.9	2.7	12.7	24.1	12.3
31-Jan-94	1.2	1.857	135	19.2	2.8	7.9	2.7	7.9	2.7	12.7	24.1	12.8
01-Feb-94	1.2	1.857	137	19.4	2.8	8.0	2.7	8.0	2.7	12.8	24.3	12.7
02-Feb-94	1.1	1.702	132	20.4	2.9	8.4	2.8	8.4	2.8	13.6	25.5	12.9
03-Feb-94	1.1	1.702	136	21.0	3.0	8.6	2.9	8.6	2.9	13.9	26.0	13.2
04-Feb-94	1.1	1.702	134	20.7	3.0	8.5	2.9	8.5	2.9	13.7	25.8	13.5
05-Feb-94	1.1	1.702	136	21.0	3.0	8.6	2.9	8.6	2.9	13.9	26.0	13.8
06-Feb-94	1	1.547	135	22.8	3.2	9.4	3.1	9.4	3.1	15.1	28.2	14.2
07-Feb-94	1.1	1.702	135	20.8	3.0	8.6	2.9	8.6	2.9	13.8	25.9	14.1
08-Feb-94	1.1	1.702	137	21.1	3.0	8.7	2.9	8.7	2.9	14.0	26.2	14.2
09-Feb-94	1.1	1.702	140	21.6	3.1	8.8	2.9	8.8	2.9	14.2	26.6	14.3
10-Feb-94	1.1	1.702	135	20.8	3.0	8.6	2.9	8.6	2.9	13.8	25.9	13.9
11-Feb-94	1	1.547	134	22.7	3.2	9.3	3.1	9.3	3.1	15.0	28.0	14.2
12-Feb-94	1.1	1.702	132	20.4	2.9	8.4	2.8	8.4	2.8	13.6	25.5	14.1
13-Feb-94	1.3	2.011	137	18.0	2.7	7.4	2.5	7.4	2.5	11.9	22.7	13.6
14-Feb-94	1.2	1.857	134	19.0	2.8	7.8	2.6	7.8	2.6	12.6	23.9	13.3
15-Feb-94	1.3	2.011	138	18.2	2.7	7.4	2.5	7.4	2.5	11.9	22.8	12.5
16-Feb-94	1.3	2.011	135	17.8	2.7	7.3	2.5	7.3	2.5	11.7	22.5	12.0
17-Feb-94	2.2	3.404	151	12.1	2.1	4.8	1.8	4.8	1.8	7.8	16.2	11.0
18-Feb-94	1.6	2.476	143	15.4	2.4	6.2	2.2	6.2	2.2	10.1	19.8	10.4
19-Feb-94	1.4	2.166	145	17.7	2.7	7.2	2.5	7.2	2.5	11.6	22.2	10.3
20-Feb-94	1.3	2.011	133	17.5	2.7	7.2	2.5	7.2	2.5	11.6	22.3	10.2
21-Feb-94	1.4	2.166	137	16.8	2.6	6.8	2.4	6.8	2.4	11.1	21.4	11.1
22-Feb-94	1.7	2.630	135	13.8	2.3	5.6	2.0	5.6	2.0	9.1	18.2	10.8
23-Feb-94	2	3.094	151	13.2	2.2	5.2	1.9	5.2	1.9	8.5	17.3	10.1
24-Feb-94	2.3	3.559	130	10.1	1.9	4.1	1.6	4.1	1.6	6.7	14.6	8.8
25-Feb-94	2	3.094	137	12.1	2.1	4.9	1.8	4.9	1.8	7.9	16.4	8.0
26-Feb-94	3	4.642	149	9.0	1.8	3.6	1.5	3.6	1.5	5.8	13.4	7.2
27-Feb-94	2.1	3.249	144	12.1	2.1	4.8	1.8	4.8	1.8	7.8	16.3	7.1
28-Feb-94	1.8	2.785	170	16.3	2.5	6.4	2.2	6.4	2.2	10.3	20.1	8.0
01-Mar-94	1.6	2.476	253	26.6	3.6	9.7	3.2	9.7	3.2	15.7	29.1	9.9
02-Mar-94	2.6	4.023	351	22.8	3.2	7.8	2.6	7.8	2.6	12.6	23.9	11.6
03-Mar-94	3.4	5.260	1480	71.3	8.0	18.8	6.0	18.8	6.0	30.2	54.3	17.2
04-Mar-94	2.6	4.023	1250	78.7	8.8	21.4	6.8	21.4	6.8	34.4	61.7	23.2
05-Mar-94	1.9	2.940	563	48.9	5.8	15.5	5.0	15.5	5.0	24.9	45.0	25.5
06-Mar-94	1.7	2.630	183	18.4	2.7	7.1	2.4	7.1	2.4	11.5	22.1	25.2
07-Mar-94	1.5	2.321	146	16.7	2.6	6.7	2.3	6.7	2.3	10.9	21.1	20.4
08-Mar-94	1.4	2.166	151	18.4	2.7	7.4	2.5	7.4	2.5	11.9	22.8	14.8
09-Mar-94	1.4	2.166	146	17.9	2.7	7.2	2.5	7.2	2.5	11.6	22.3	11.5
10-Mar-94	1.5	2.321	150	17.2	2.6	6.9	2.4	6.9	2.4	11.1	21.4	11.4
11-Mar-94	1.4	2.166	149	18.2	2.7	7.3	2.5	7.3	2.5	11.8	22.6	11.6
12-Mar-94	1.3	2.011	145	19.0	2.8	7.7	2.6	7.7	2.6	12.4	23.6	11.7
13-Mar-94	1.3	2.011	152	19.9	2.9	8.0	2.7	8.0	2.7	12.9	24.4	12.0
14-Mar-94	1.4	2.166	143	17.5	2.7	7.1	2.4	7.1	2.4	11.4	22.0	12.1
15-Mar-94	1.3	2.011	146	19.1	2.8	7.7	2.6	7.7	2.6	12.5	23.7	12.3
16-Mar-94	1.5	2.321	145	16.6	2.6	6.7	2.3	6.7	2.3	10.8	21.0	11.9
17-Mar-94	1.9	2.940	149	13.7	2.3	5.5	2.0	5.5	2.0	8.8	17.8	10.9
18-Mar-94	2.4	3.713	172	12.6	2.2	4.9	1.8	4.9	1.8	7.9	16.4	10.0
19-Mar-94	1.7	2.630	149	15.2	2.4	6.1	2.1	6.1	2.1	9.8	19.4	9.3
20-Mar-94	2	3.094	153	13.4	2.2	5.3	1.9	5.3	1.9	8.6	17.4	8.8
21-Mar-94	2.1	3.249	156	13.0	2.2	5.1	1.9	5.1	1.9	8.3	17.0	8.6
22-Mar-94	1.9	2.940	148	13.6	2.3	5.4	2.0	5.4	2.0	8.8	17.7	8.9
23-Mar-94	1.7	2.630	145	14.8	2.4	5.9	2.1	5.9	2.1	9.6	19.0	8.8
24-Mar-94	1.5	2.321	146	16.7	2.6	6.7	2.3	6.7	2.3	10.9	21.1	9.4
25-Mar-94	1.4	2.166	143	17.5	2.7	7.1	2.4	7.1	2.4	11.4	22.0	10.2
26-Mar-94	1.3	2.011	144	18.9	2.8	7.7	2.6	7.7	2.6	12.3	23.5	11.1
27-Mar-94	1.3	2.011	150	19.6	2.9	7.9	2.7	7.9	2.7	12.7	24.1	11.8
28-Mar-94	1.4	2.166	150	18.3	2.7	7.3	2.5	7.3	2.5	11.9	22.7	12.1
29-Mar-94	1.1	1.702	157	24.1	3.3	9.6	3.2	9.6	3.2	15.5	28.8	13.1
30-Mar-94	1.1	1.702	142	21.9	3.1	8.9	3.0	8.9	3.0	14.4	26.8	13.6

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation)

Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs):	River Discharge Rate at USGS 12100000 (cfs)	Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox, 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
				Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
31-Mar-94	1.1	1.702	142	21.9	3.1	8.9	3.0	8.9	3.0	14.4	26.8	14.0
01-Apr-94	1.1	1.702	147	22.6	3.2	9.2	3.0	9.2	3.0	14.7	27.5	14.7
02-Apr-94	1	1.547	149	25.1	3.4	10.2	3.3	10.2	3.3	16.3	30.2	14.9
03-Apr-94	1.1	1.702	147	22.6	3.2	9.2	3.0	9.2	3.0	14.7	27.5	15.0
04-Apr-94	1.1	1.702	143	22.0	3.1	9.0	3.0	9.0	3.0	14.4	27.0	15.1
05-Apr-94	1.2	1.857	147	20.8	3.0	8.4	2.8	8.4	2.8	13.5	25.5	14.8
06-Apr-94	1.5	2.321	151	17.3	2.6	6.9	2.4	6.9	2.4	11.2	21.5	13.5
07-Apr-94	1.5	2.321	144	16.5	2.6	6.7	2.3	6.7	2.3	10.8	20.9	12.5
08-Apr-94	1.9	2.940	165	15.0	2.4	5.9	2.1	5.9	2.1	9.5	18.9	11.2
09-Apr-94	1.5	2.321	157	17.9	2.7	7.1	2.4	7.1	2.4	11.5	22.1	10.7
10-Apr-94	1.4	2.166	162	19.7	2.9	7.8	2.6	7.8	2.6	12.6	23.9	11.1
11-Apr-94	1.4	2.166	143	17.5	2.7	7.1	2.4	7.1	2.4	11.4	22.0	11.3
12-Apr-94	1.7	2.630	160	16.2	2.5	6.4	2.2	6.4	2.2	10.3	20.2	11.5
13-Apr-94	1.5	2.321	145	16.6	2.6	6.7	2.3	6.7	2.3	10.8	21.0	11.3
14-Apr-94	1.4	2.166	141	17.3	2.6	7.0	2.4	7.0	2.4	11.3	21.8	11.0
15-Apr-94	1.3	2.011	145	19.0	2.8	7.7	2.6	7.7	2.6	12.4	23.6	11.2
16-Apr-94	1.3	2.011	153	20.0	2.9	8.0	2.7	8.0	2.7	12.9	24.5	11.9
17-Apr-94	1.2	1.857	155	21.9	3.1	8.8	2.9	8.8	2.9	14.1	26.5	12.7
18-Apr-94	1.3	2.011	152	19.9	2.9	8.0	2.7	8.0	2.7	12.9	24.4	13.1
19-Apr-94	1.2	1.857	195	27.3	3.6	10.5	3.5	10.5	3.5	16.9	31.2	14.2
20-Apr-94	1.3	2.011	205	26.5	3.5	10.1	3.3	10.1	3.3	16.3	30.1	15.0
21-Apr-94	1.6	2.476	236	24.8	3.4	9.2	3.1	9.2	3.1	14.8	27.6	15.2
22-Apr-94	1.4	2.166	223	26.7	3.6	10.0	3.3	10.0	3.3	16.2	29.9	16.0
23-Apr-94	1.3	2.011	185	24.0	3.3	9.3	3.1	9.3	3.1	15.0	27.9	15.6
24-Apr-94	1.3	2.011	395	50.1	5.9	17.0	5.5	17.0	5.5	27.3	49.2	18.3
25-Apr-94	1.2	1.857	369	50.7	6.0	17.4	5.6	17.4	5.6	28.0	50.4	21.6
26-Apr-94	1.2	1.857	368	50.6	6.0	17.4	5.6	17.4	5.6	27.9	50.3	24.6
27-Apr-94	1.1	1.702	367	54.9	6.4	18.9	6.1	18.9	6.1	30.4	54.6	28.4
28-Apr-94	1.2	1.857	379	52.0	6.1	17.8	5.7	17.8	5.7	28.6	51.5	28.7
29-Apr-94	1.3	2.011	381	48.4	5.7	16.5	5.3	16.5	5.3	26.5	47.9	28.4
30-Apr-94	1.1	1.702	186	26.3	3.7	11.0	3.6	11.0	3.6	17.7	32.6	25.8
01-Nov-94	1.9	2.940	1910	163.4	17.2	41.2	13.1	41.2	13.1	66.0	117.6	
02-Nov-94	1.6	2.476	1770	179.8	18.9	46.0	14.6	46.0	14.6	73.7	131.3	
03-Nov-94	1.6	2.476	1040	106.0	11.5	30.0	9.5	30.0	9.5	48.1	85.9	
04-Nov-94	1.9	2.940	170	15.5	2.4	6.0	2.1	6.0	2.1	9.7	19.3	49.4
05-Nov-94	1.6	2.476	141	15.2	2.4	6.2	2.2	6.2	2.2	10.0	19.6	35.4
06-Nov-94	1.6	2.476	140	15.1	2.4	6.1	2.2	6.1	2.2	9.9	19.5	19.4
07-Nov-94	1.5	2.321	136	15.7	2.5	6.4	2.2	6.4	2.2	10.3	20.1	10.0
08-Nov-94	1.5	2.321	133	15.3	2.4	6.3	2.2	6.3	2.2	10.1	19.9	10.1
09-Nov-94	1.6	2.476	132	14.3	2.3	5.9	2.1	5.9	2.1	9.5	18.8	9.9
10-Nov-94	1.5	2.321	128	14.8	2.4	6.1	2.1	6.1	2.1	9.8	19.4	9.9
11-Nov-94	1.5	2.321	129	14.9	2.4	6.1	2.2	6.1	2.2	9.9	19.5	9.8
12-Nov-94	1.2	1.857	128	18.2	2.7	7.5	2.6	7.5	2.6	12.2	23.2	10.3
13-Nov-94	1.4	2.166	127	15.7	2.5	6.5	2.3	6.5	2.3	10.4	20.4	10.6
14-Nov-94	1.5	2.321	129	14.9	2.4	6.1	2.2	6.1	2.2	9.9	19.5	10.6
15-Nov-94	1.7	2.630	131	13.5	2.2	5.5	2.0	5.5	2.0	8.9	17.9	10.3
16-Nov-94	2.2	3.404	142	11.4	2.0	4.6	1.7	4.6	1.7	7.4	15.7	9.2
17-Nov-94	1.8	2.785	132	12.8	2.2	5.2	1.9	5.2	1.9	8.5	17.3	8.7
18-Nov-94	1.6	2.476	136	14.7	2.4	6.0	2.1	6.0	2.1	9.7	19.2	8.5
19-Nov-94	2	3.094	144	12.6	2.2	5.1	1.9	5.1	1.9	8.2	16.8	8.4
20-Nov-94	2	3.094	180	15.5	2.5	6.0	2.1	6.0	2.1	9.7	19.2	9.0
21-Nov-94	1.7	2.630	142	14.5	2.3	5.8	2.1	5.8	2.1	9.4	18.8	9.3
22-Nov-94	1.7	2.630	133	13.6	2.3	5.6	2.0	5.6	2.0	9.0	18.1	9.1
23-Nov-94	1.7	2.630	133	13.6	2.3	5.6	2.0	5.6	2.0	9.0	18.1	9.3
24-Nov-94	1.5	2.321	130	15.0	2.4	6.2	2.2	6.2	2.2	9.9	19.6	9.3
25-Nov-94	2.2	3.404	136	11.0	2.0	4.4	1.7	4.4	1.7	7.2	15.3	8.8
26-Nov-94	2.6	4.023	140	9.7	1.9	3.9	1.6	3.9	1.6	6.3	14.1	8.1
27-Nov-94	2.1	3.249	136	11.5	2.0	4.6	1.7	4.6	1.7	7.5	15.8	7.7
28-Nov-94	1.8	2.785	137	13.3	2.2	5.4	1.9	5.4	1.9	8.7	17.6	7.4
29-Nov-94	2.6	4.023	152	10.4	1.9	4.1	1.6	4.1	1.6	6.7	14.6	7.3
30-Nov-94	4.5	6.962	1590	58.1	6.7	15.1	4.9	15.1	4.9	24.2	43.8	11.8
01-Dec-94	3.5	5.415	1800	84.1	9.3	21.4	6.8	21.4	6.8	34.3	61.5	18.5
02-Dec-94	2.8	4.332	2270	132.0	14.1	32.1	10.2	32.1	10.2	51.5	91.9	29.2
03-Dec-94	2	3.094	2030	165.0	17.4	41.1	13.0	41.1	13.0	65.8	117.4	44.0
04-Dec-94	1.8	2.785	1740	157.2	16.6	40.3	12.8	40.3	12.8	64.6	115.2	54.1
05-Dec-94	1.6	2.476	918	93.7	10.3	27.2	8.6	27.2	8.6	43.5	77.8	56.4
06-Dec-94	1.7	2.630	253	25.0	3.4	9.2	3.0	9.2	3.0	14.8	27.5	47.2
07-Dec-94	1.5	2.321	296	32.9	4.2	11.7	3.8	11.7	3.8	18.9	34.6	35.4
08-Dec-94	1.6	2.476	189	20.1	2.9	7.7	2.6	7.7	2.6	12.5	23.7	22.4
09-Dec-94	1.6	2.476	173	18.5	2.7	7.2	2.5	7.2	2.5	11.6	22.3	14.4
10-Dec-94	1.6	2.476	154	16.8	2.6	6.6	2.3	6.6	2.3	10.6	20.7	13.4
11-Dec-94	1.6	2.476	148	15.9	2.5	6.4	2.2	6.4	2.2	10.3	20.2	11.3
12-Dec-94	1.5	2.321	146	16.7	2.6	6.7	2.3	6.7	2.3	10.9	21.1	10.9
13-Dec-94	1.5	2.321	140	16.1	2.5	6.5	2.3	6.5	2.3	10.5	20.5	10.6
14-Dec-94	1.5	2.321	136	15.7	2.5	6.4	2.2	6.4	2.2	10.3	20.1	10.5
15-Dec-94	1.6	2.476	136	14.7	2.4	6.0	2.1	6.0	2.1	9.7	19.2	10.3
16-Dec-94	2.2	3.404	155	12.4	2.1	4.9	1.8	4.9	1.8	7.9	16.4	9.6
17-Dec-94	2.5	3.868	259	17.7	2.7	6.4	2.2	6.4	2.2	10.4	20.2	9.6
18-Dec-94	2	3.094	265	22.4	3.1	8.1	2.7	8.1	2.7	13.1	24.7	10.3
19-Dec-94	2	3.094	222	18.9	2.8	7.1	2.4	7.1	2.4	11.4	21.9	10.7
20-Dec-94	4.4	6.808	392	15.4	2.4	5.1	1.9	5.1	1.9	8.3	17.0	10.8
21-Dec-94	2.8	4.332	384	23.2	3.2	7.8	2.6	7.8	2.6	12.6	23.9	11.3

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation.)

Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs)	River Discharge Rate at USGS 12100000 (cfs)	Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox, 1995; Fischer et al., 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
				Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
22-Dec-94	2.2	3.404	262	20.2	2.9	7.3	2.5	7.3	2.5	11.8	22.6	11.0
23-Dec-94	1.9	2.940	238	21.2	3.0	7.8	2.7	7.8	2.7	12.6	24.0	11.3
24-Dec-94	1.7	2.630	216	21.5	3.1	8.1	2.7	8.1	2.7	13.0	24.7	12.5
25-Dec-94	2.1	3.249	191	15.7	2.5	6.0	2.1	6.0	2.1	9.7	19.2	11.8
26-Dec-94	4.7	7.272	409	15.1	2.4	5.0	1.8	5.0	1.8	8.1	16.6	10.9
27-Dec-94	3.7	5.725	1840	81.4	9.0	20.6	6.6	20.6	6.6	33.0	59.3	16.0
28-Dec-94	2.5	3.868	4470	289.9	29.9	62.0	19.6	62.0	19.6	99.3	176.8	37.5
29-Dec-94	2.1	3.249	4280	330.3	33.9	71.3	22.6	71.3	22.6	114.2	203.2	63.6
30-Dec-94	1.8	2.785	3970	357.4	36.6	78.3	24.8	78.3	24.8	125.3	223.0	93.0
31-Dec-94	1.7	2.630	3610	344.1	35.3	76.8	24.3	76.8	24.3	122.9	218.8	115.4
01-Jan-95	1.6	2.476	2180	221.2	23.0	54.4	17.2	54.4	17.2	87.1	155.1	112.4
02-Jan-95	1.7	2.630	1240	118.9	12.8	32.5	10.3	32.5	10.3	52.1	93.1	96.9
03-Jan-95	1.6	2.476	1130	115.1	12.4	32.1	10.2	32.1	10.2	51.4	91.8	78.4
04-Jan-95	1.6	2.476	1040	106.0	11.5	30.0	9.5	30.0	9.5	48.1	85.9	59.7
05-Jan-95	1.6	2.476	1170	119.2	12.8	33.0	10.5	33.0	10.5	52.9	94.4	51.1
06-Jan-95	1.5	2.321	1190	129.2	13.8	35.7	11.3	35.7	11.3	57.2	101.9	52.4
07-Jan-95	1.5	2.321	1130	122.7	13.2	34.2	10.9	34.2	10.9	54.8	97.8	53.2
08-Jan-95	1.5	2.321	1100	119.5	12.8	33.5	10.6	33.5	10.6	53.7	95.8	54.6
09-Jan-95	1.6	2.476	800	81.8	9.1	24.3	7.7	24.3	7.7	39.0	69.8	51.2
10-Jan-95	1.8	2.785	456	41.9	5.1	13.8	4.5	13.8	4.5	22.2	40.3	42.4
11-Jan-95	1.6	2.476	413	42.7	5.2	14.3	4.6	14.3	4.6	23.0	41.8	34.5
12-Jan-95	1.7	2.630	411	40.1	4.9	13.4	4.4	13.4	4.4	21.6	39.3	26.5
13-Jan-95	1.8	2.785	385	35.6	4.5	12.1	3.9	12.1	3.9	19.4	35.5	21.6
14-Jan-95	1.7	2.630	352	34.5	4.3	11.9	3.9	11.9	3.9	19.1	35.0	20.8
15-Jan-95	1.9	2.940	390	34.2	4.3	11.6	3.8	11.6	3.8	18.8	34.1	19.7
16-Jan-95	1.9	2.940	414	36.2	4.5	12.1	3.9	12.1	3.9	19.5	35.6	19.2
17-Jan-95	1.9	2.940	376	33.0	4.2	11.2	3.7	11.2	3.7	18.1	33.2	18.8
18-Jan-95	2	3.094	344	28.8	3.8	9.9	3.3	9.9	3.3	16.0	29.7	18.0
19-Jan-95	1.9	2.785	252	23.6	3.3	8.6	2.9	8.6	2.9	13.9	26.1	16.9
20-Jan-95	1.7	2.630	164	16.6	2.6	6.5	2.3	6.5	2.3	10.5	20.5	14.6
21-Jan-95	1.8	2.476	137	14.8	2.4	6.0	2.1	6.0	2.1	9.7	19.3	12.8
22-Jan-95	1.5	2.321	138	15.9	2.5	6.4	2.2	6.4	2.2	10.4	20.3	11.2
23-Jan-95	1.5	2.321	139	16.0	2.5	6.5	2.3	6.5	2.3	10.5	20.4	10.3
24-Jan-95	1.4	2.166	137	16.8	2.6	6.8	2.4	6.8	2.4	11.1	21.4	10.4
25-Jan-95	1.4	2.166	138	16.9	2.6	6.9	2.4	6.9	2.4	11.1	21.5	10.8
26-Jan-95	1.4	2.166	141	17.3	2.6	7.0	2.4	7.0	2.4	11.3	21.8	11.0
27-Jan-95	1.4	2.166	139	17.0	2.6	6.9	2.4	6.9	2.4	11.2	21.6	11.2
28-Jan-95	1.7	2.630	142	14.5	2.3	5.8	2.1	5.8	2.1	9.4	18.8	10.8
29-Jan-95	1.9	2.940	169	15.4	2.4	6.0	2.1	6.0	2.1	9.7	19.2	10.4
30-Jan-95	2.4	3.713	197	14.3	2.3	5.4	2.0	5.4	2.0	8.7	17.7	9.8
31-Jan-95	2.8	4.332	935	55.0	6.4	15.8	5.1	15.8	5.1	25.4	45.8	13.3
01-Feb-95	3	4.642	1700	92.6	10.2	23.8	7.6	23.8	7.6	38.2	68.3	20.5
02-Feb-95	2.2	3.404	1870	138.3	14.7	35.0	11.1	35.0	11.1	56.1	100.0	32.1
03-Feb-95	1.9	2.940	1850	158.3	16.7	40.1	12.7	40.1	12.7	64.3	114.7	46.0
04-Feb-95	1.7	2.630	1740	166.4	17.5	42.7	13.5	42.7	13.5	68.4	121.9	56.7
05-Feb-95	1.7	2.630	1560	149.3	15.8	39.1	12.4	39.1	12.4	62.7	111.7	62.9
06-Feb-95	1.6	2.476	1270	129.3	13.8	35.2	11.2	35.2	11.2	56.5	100.7	63.0
07-Feb-95	1.6	2.476	991	101.1	11.0	28.9	9.2	28.9	9.2	46.3	82.7	58.5
08-Feb-95	1.5	2.321	463	50.9	6.0	16.7	5.4	16.7	5.4	26.9	48.5	48.1
09-Feb-95	1.5	2.321	173	19.6	2.9	7.7	2.6	7.7	2.6	12.4	23.6	35.5
10-Feb-95	1.4	2.166	160	19.5	2.8	7.7	2.6	7.7	2.6	12.5	23.7	24.5
11-Feb-95	1.9	2.940	170	15.5	2.4	6.0	2.1	6.0	2.1	9.7	19.3	15.4
12-Feb-95	1.8	2.476	156	16.8	2.6	6.7	2.3	6.7	2.3	10.8	20.9	11.3
13-Feb-95	1.7	2.630	148	15.1	2.4	6.0	2.1	6.0	2.1	9.7	19.3	10.7
14-Feb-95	1.8	2.476	142	15.3	2.4	6.2	2.2	6.2	2.2	10.0	19.7	10.1
15-Feb-95	1.6	2.476	143	15.4	2.4	6.2	2.2	6.2	2.2	10.1	19.8	10.1
16-Feb-95	1.7	2.630	138	14.1	2.3	5.7	2.0	5.7	2.0	9.2	18.5	9.8
17-Feb-95	2.1	3.249	160	13.3	2.2	5.2	1.9	5.2	1.9	8.5	17.3	9.4
18-Feb-95	3.3	5.106	192	10.4	1.9	3.9	1.6	3.9	1.6	6.4	14.2	8.5
19-Feb-95	4.3	6.653	1910	72.8	8.2	18.2	5.8	18.2	5.8	28.3	52.7	13.4
20-Feb-95	3.7	5.725	2420	106.7	11.6	25.6	8.2	25.6	8.2	41.1	73.5	21.3
21-Feb-95	2.6	4.023	2360	147.7	15.7	35.7	11.3	35.7	11.3	57.2	102.0	33.5
22-Feb-95	2.1	3.249	2290	177.2	18.6	43.1	13.7	43.1	13.7	69.1	123.1	49.2
23-Feb-95	1.9	2.940	2200	188.1	19.7	46.1	14.6	46.1	14.6	73.9	131.7	60.3
24-Feb-95	1.9	2.940	2100	179.6	18.9	44.4	14.1	44.4	14.1	71.2	126.9	67.9
25-Feb-95	1.8	2.785	1960	176.9	18.6	44.4	14.1	44.4	14.1	71.1	126.7	71.3
26-Feb-95	1.6	2.476	1750	177.7	18.7	45.6	14.4	45.6	14.4	73.0	130.1	72.3
27-Feb-95	1.6	2.476	1030	105.0	11.4	29.8	9.5	29.8	9.5	47.7	85.3	65.8
28-Feb-95	1.5	2.321	297	33.0	4.2	11.8	3.8	11.8	3.8	18.9	34.6	52.7
01-Mar-95	1.5	2.321	179	20.3	2.9	7.9	2.7	7.9	2.7	12.7	24.1	38.1
02-Mar-95	1.5	2.321	194	21.9	3.1	8.4	2.8	8.4	2.8	13.5	25.5	23.2
03-Mar-95	1.4	2.166	175	21.2	3.0	8.3	2.8	8.3	2.8	13.4	25.2	14.6
04-Mar-95	1.5	2.321	174	19.7	2.9	7.7	2.6	7.7	2.6	12.4	23.7	13.0
05-Mar-95	1.5	2.321	181	20.5	2.9	8.0	2.7	8.0	2.7	12.8	24.3	13.0
06-Mar-95	1.4	2.166	765	89.3	9.8	26.8	8.5	26.8	8.5	43.0	76.8	20.4
07-Mar-95	1.4	2.166	1450	168.4	17.7	44.8	14.2	44.8	14.2	71.7	127.8	35.0
08-Mar-95	1.8	2.785	575	52.6	6.2	16.6	5.3	16.6	5.3	26.7	48.1	38.6
09-Mar-95	2.5	3.868	195	13.6	2.3	5.2	1.9	5.2	1.9	8.3	17.1	37.4
10-Mar-95	2.2	3.404	194	15.2	2.4	5.8	2.1	5.8	2.1	9.4	18.7	29.0
11-Mar-95	2.6	4.023	199	13.4	2.2	5.0	1.9	5.0	1.9	8.2	16.8	13.1
12-Mar-95	2.3	3.558	227	16.9	2.6	6.3	2.2	6.3	2.2	10.1	19.9	9.0
13-Mar-95	2.1	3.249	200	16.4	2.5	6.2	2.2	6.2	2.2	10.0	19.7	9.4
14-Mar-95	2	3.094	188	16.2	2.5	6.2	2.2	6.2	2.2	10.0	19.7	9.6

Continuous simulation of Enumclaw Waste Load Allocations for ammonia during the November-April permit season (using Fox's proposed mixing zone model modification of the Fischer equation.)

Date	Effluent Discharge Rate (mgd)	Effluent Discharge Rate (cfs)	River Discharge Rate at USGS 12100000 (cfs)	Maximum Allowable Dilution Factors Based on Percentages of River Flow in WAC 173-201A-100 (25% for Chronic, 2.5% for acute)		Centerline Dilution Factors Predicted at the Mixing Zone Boundary Using the Dilution Model Proposed by Fox (Fox 1995; Fischer et al. 1979)		Selected Limiting Dilution Factor Based on Minimum of Model Prediction vs Percentage of River Flow		Continuous Simulation of Ammonia WLAs		
										Waste Load Allocations For Ammonia Assuming Upstream Ammonia (Ca) = 0.1 mgN/L, WLA=WQS*DF-Ca*(DF-1)		WLA Running Averages for 4-day Averaging Period
				Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic (mgN/L)	Acute (mgN/L)	Chronic (mgN/L)
15-Mar-95	1.9	2.940	184	16.6	2.6	6.4	2.2	6.4	2.2	10.4	20.2	10.1
16-Mar-95	1.8	2.785	182	17.3	2.6	6.7	2.3	6.7	2.3	10.8	21.0	10.3
17-Mar-95	1.7	2.630	858	82.6	9.2	24.2	7.7	24.2	7.7	38.8	69.5	17.5
18-Mar-95	2.1	3.249	1790	138.7	14.8	35.4	11.2	35.4	11.2	56.7	101.1	29.2
19-Mar-95	1.9	2.940	1190	102.2	11.1	28.2	9.0	28.2	9.0	45.2	80.7	37.9
20-Mar-95	1.6	2.476	241	25.3	3.4	9.4	3.1	9.4	3.1	15.1	28.1	38.9
21-Mar-95	1.7	2.630	180	18.1	2.7	7.0	2.4	7.0	2.4	11.3	21.8	32.1
22-Mar-95	1.7	2.630	300	29.5	3.9	10.5	3.4	10.5	3.4	16.9	31.1	22.1
23-Mar-95	1.9	2.940	1140	97.9	10.7	27.2	8.7	27.2	8.7	43.6	78.0	21.7
24-Mar-95	1.6	2.476	176	18.8	2.8	7.3	2.5	7.3	2.5	11.8	22.6	20.9
25-Mar-95	1.5	2.321	160	18.2	2.7	7.2	2.5	7.2	2.5	11.7	22.4	21.0
26-Mar-95	1.6	2.476	156	16.8	2.6	6.7	2.3	6.7	2.3	10.8	20.9	19.5
27-Mar-95	1.6	2.476	154	16.6	2.6	6.6	2.3	6.6	2.3	10.6	20.7	11.2
28-Mar-95	1.6	2.476	153	16.5	2.5	6.6	2.3	6.6	2.3	10.6	20.6	10.9
29-Mar-95	1.5	2.321	150	17.2	2.6	6.9	2.4	6.9	2.4	11.1	21.4	10.8
30-Mar-95	1.6	2.476	151	16.2	2.5	6.5	2.3	6.5	2.3	10.5	20.5	10.7
31-Mar-95	1.5	2.321	152	17.4	2.6	6.9	2.4	6.9	2.4	11.2	21.6	10.8
01-Apr-95	1.6	2.476	153	16.5	2.5	6.6	2.3	6.6	2.3	10.6	20.6	10.8
02-Apr-95	1.7	2.630	149	15.2	2.4	6.1	2.1	6.1	2.1	9.8	19.4	10.5
03-Apr-95	1.6	2.476	147	15.8	2.5	6.4	2.2	6.4	2.2	10.3	20.1	10.5
04-Apr-95	1.5	2.321	147	16.8	2.6	6.8	2.3	6.8	2.3	10.9	21.2	10.4
05-Apr-95	1.6	2.476	148	15.9	2.5	6.4	2.2	6.4	2.2	10.3	20.2	10.3
06-Apr-95	1.5	2.321	151	17.3	2.6	6.9	2.4	6.9	2.4	11.2	21.5	10.7
07-Apr-95	1.6	2.476	150	16.1	2.5	6.5	2.3	6.5	2.3	10.4	20.4	10.7
08-Apr-95	1.5	2.321	154	17.6	2.7	7.0	2.4	7.0	2.4	11.3	21.8	10.8
09-Apr-95	1.5	2.321	153	17.5	2.6	7.0	2.4	7.0	2.4	11.3	21.7	11.0
10-Apr-95	1.7	2.630	154	15.6	2.5	6.2	2.2	6.2	2.2	10.0	19.8	10.8
11-Apr-95	1.9	2.940	157	14.4	2.3	5.7	2.0	5.7	2.0	9.2	18.4	10.5
12-Apr-95	1.7	2.630	144	14.7	2.4	5.9	2.1	5.9	2.1	9.5	19.0	10.0
13-Apr-95	1.6	2.476	152	16.4	2.5	6.5	2.3	6.5	2.3	10.5	20.5	9.8
14-Apr-95	1.4	2.166	146	17.9	2.7	7.2	2.5	7.2	2.5	11.6	22.3	10.2
15-Apr-95	1.5	2.321	141	16.2	2.5	6.6	2.3	6.6	2.3	10.6	20.6	10.6
16-Apr-95	1.4	2.166	140	17.2	2.6	7.0	2.4	7.0	2.4	11.2	21.7	11.0
17-Apr-95	1.4	2.166	142	17.4	2.6	7.0	2.4	7.0	2.4	11.4	21.9	11.2
18-Apr-95	1.4	2.166	145	17.7	2.7	7.2	2.5	7.2	2.5	11.6	22.2	11.2
19-Apr-95	1.4	2.166	141	17.3	2.6	7.0	2.4	7.0	2.4	11.3	21.8	11.4
20-Apr-95	1.4	2.166	147	18.0	2.7	7.2	2.5	7.2	2.5	11.7	22.4	11.5
21-Apr-95	1.4	2.166	145	17.7	2.7	7.2	2.5	7.2	2.5	11.6	22.2	11.5
22-Apr-95	1.4	2.166	147	18.0	2.7	7.2	2.5	7.2	2.5	11.7	22.4	11.6
23-Apr-95	1.4	2.166	147	18.0	2.7	7.2	2.5	7.2	2.5	11.7	22.4	11.6
24-Apr-95	1.5	2.321	151	17.3	2.6	6.9	2.4	6.9	2.4	11.2	21.5	11.5
25-Apr-95	1.4	2.166	149	18.2	2.7	7.3	2.5	7.3	2.5	11.8	22.6	11.6
26-Apr-95	1.4	2.166	139	17.0	2.6	6.9	2.4	6.9	2.4	11.2	21.6	11.5
27-Apr-95	1.4	2.166	140	17.2	2.6	7.0	2.4	7.0	2.4	11.2	21.7	11.3
28-Apr-95	1.5	2.321	142	16.3	2.5	6.6	2.3	6.6	2.3	10.6	20.7	11.2
29-Apr-95	1.4	2.166	140	17.2	2.6	7.0	2.4	7.0	2.4	11.2	21.7	11.1
30-Apr-95	1.4	2.166	137	16.8	2.6	6.8	2.4	6.8	2.4	11.1	21.4	11.0

Minima for Nov-Apr Permiting Periods (mg/L as N):

1987-88	13.22	9.79
1988-89	13.17	11.26
1989-90	14.61	9.55
1990-91	14.38	6.91
1991-92	12.86	9.61
1992-93	14.53	8.27
1993-94	13.37	7.05
1994-95	14.06	7.31

Log10-transformed Minima for Nov-Apr Periods:

1987-88	1.1211	0.9908
1988-89	1.1195	1.0514
1989-90	1.1645	0.9801
1990-91	1.1578	0.8394
1991-92	1.1092	0.9828
1992-93	1.1623	0.9176
1993-94	1.1260	0.8485
1994-95	1.1481	0.8637

Summary Statistics of Seasonal Minima in Units of mg/L

Mean	13.7734	8.7189
Standard Deviation	0.6968	1.5728
Mean of Log-transformed values	1.1386	0.9343
Standard Deviation of Log-transformed values	0.0220	0.0784
Annual 3-year return period from normal distribution	13.14	7.30
Annual 3-year return period from log-normal distribution	13.14	7.30

Appendix C

Example calculation of dilution factors at the acute and chronic mixing zone boundaries using the RIVPLUM4 spreadsheet

Appendix C: Modified RIVPLUM spreadsheet to calculate acute and chronic dilution factors accounting for the effective origin of the effluent discharge (Fischer et al., 1979; Fox, 1995). This example shows the dilution factors calculated for Enumclaw data from 27-Jan-92.

INPUT

	27-Jan-92 Acute	27-Jan-92 Chronic
1 Effluent Discharge Rate		
(mgd)	3.60	3.60
(cfs)	5.57	5.57
2 Receiving Water Characteristics Downstream From Waste Input		
Upstream River Flow (cfs)	170.00	170.00
Downstream River Flow (cfs)	175.57	175.57
Stream Depth (ft):	0.90	0.90
Stream Velocity (fps):	1.72	1.72
Channel Width (ft):	114.22	114.22
Stream Slope (ft/ft) or Manning roughness "n":	0.007	0.007
0 if slope or 1 if Manning "n" in previous cell:	0	0
3 Discharge Distance From Nearest Shoreline (ft):	0.00	0.00
4 Location of Point of Interest to Estimate Dilution		
Distance Downstream to Point of Interest (ft):	30.00	300.00
Distance From Nearest Shoreline (ft):	0.00	0.00
5 Transverse Mixing Coefficient Constant (usually 0.6):	0.6	0.6
6 Enter 1 (for *effective origin* of effluent source) or 0 (no adjustment of origin):	1	1

OUTPUT

1 Source Conservative Mass Input Rate		
Concentration of Conservative Substance (%):	100%	100%
Source Conservative Mass Input Rate (cfs*%):	557%	557%
2 Shear Velocity		
Shear Velocity based on slope (ft/sec):	0.449	0.449
Shear Velocity based on Manning "n":		
using Prasuhn equations 8-26 and 8-54 assuming hydraulic radius equals depth for wide channel		
Darcy-Weisbach friction factor "f":	#N/A	#N/A
Shear Velocity from Darcy-Weisbach "f" (ft/sec):	#N/A	#N/A
Selected Shear Velocity for next step (ft/sec):	0.449	0.449
3 Transverse Mixing Coefficient (ft2/sec):	0.241	0.241
5 Plume Characteristics Accounting for Shoreline Effect		
Co:	3.17E-02	3.17E-02
y'o:	0.00E+00	0.00E+00
x':	3.23E-04	3.23E-03
y' at point of interest:	0.00E+00	0.00E+00
Solution using superposition equation (Fischer eqn 5.9)		
Term for n= -2	0.00E+00	0.00E+00
Term for n= -1	0.00E+00	1.05E-134
Term for n= 0	2.00E+00	2.00E+00
Term for n= 1	0.00E+00	1.05E-134
Term for n= 2	0.00E+00	0.00E+00
Sum of Superposition Terms for n= -2 to 2	2.00E+00	2.00E+00
Upstream Distance from Outfall to *Effective Origin* of Effluent Source (ft)	2.97E+01	2.97E+01
x' Corrected for *Effective Origin*	6.44E-04	3.55E-03
C/Co (dimensionless):	2.22E+01	9.46E+00
Concentration at Point of Interest (Fischer Eqn 5.9):	7.05E-01	3.00E-01
Unbounded Plume Width at Point of Interest (ft):	11.620	36.746
Plume half-width (ft)	5.810	18.373
Distance from near shore to discharge point (ft)	0.00	0.00
Distance from far shore to discharge point (ft)	114.22	114.22
Plume width bounded by shoreline (ft)	5.81	18.37
Approximate Downstream Distance to Complete Mix (ft):	37,103	37,103
Theoretical Dilution Factor at Complete Mix:	31.521	31.521
Calculated Flux-Average Dilution Factor Across Entire Plume Width:	1.603	5.070
Calculated Dilution Factor at Point of Interest:	1.418	3.331

Appendix D

Calculation of recommended water quality based permit limits for ammonia based on WLAs from continuous simulation modeling

Recommended water quality-based permit limits for ammonia during November-April.
(based on EPA/505/2-90-001 Box 5-2).

Based on Lotus File WQBP2.WK1, Ecology Permit Writer's Manual

INPUT

	Annual 3-year Return Period
1. Recommended Waste Load Allocations for November-April from Continuous Simulation	
Acute (one-hour) WLA:	13.14
Chronic (n1-day) WLA:	7.30
2. Coefficient of Variation for Effluent Concentration (use 0.6 if data are not available):	0.6
3. Number of days (n1) for chronic average (usually four or seven; four is recommended):	4
4. Number of samples (n2) required per month for monitoring:	9

OUTPUT

1 Z Statistics	
LTA Derivation (99%tile):	2.326
Daily Maximum Permit Limit (99%tile):	2.326
Monthly Average Permit Limit (95%tile):	1.645
2. Derivation of LTAs using April 1990 TSD (Box 5-2 Step 2 & 3)	
Sigma^2:	0.3075
Sigma^2-n1:	0.0862
LTA for Acute (1-hour) WLA:	4.219
LTA for Chronic (n1-day) WLA:	3.850
Most Limiting LTA (minimum of acute and chronic):	3.850
3. Derivation of Permit Limits From Limiting LTA (Box 5-2 Step 4)	
Sigma^2-n2:	0.0392
Daily Maximum Permit Limit:	12.0
Monthly Average Permit Limit:	5.2