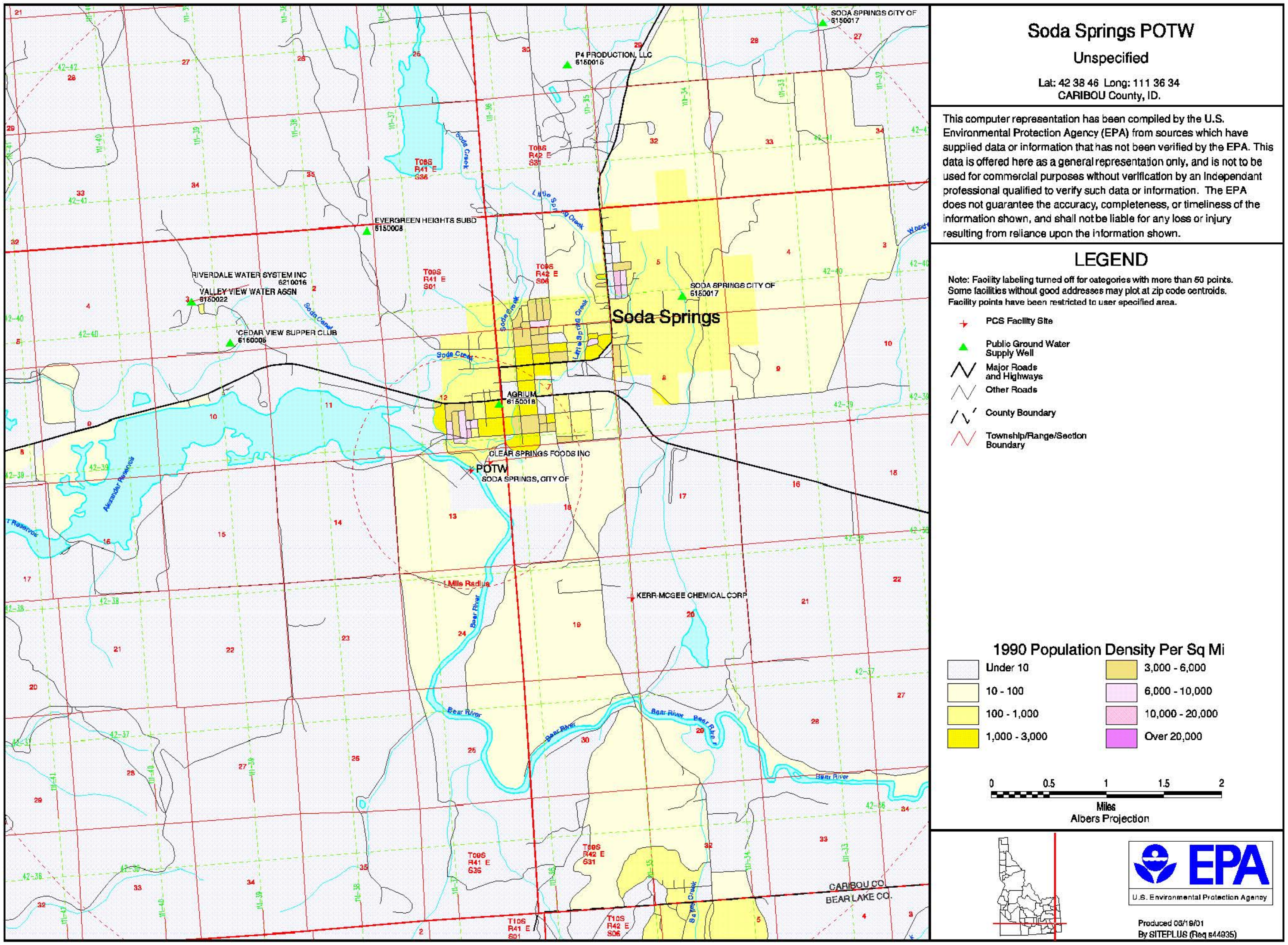
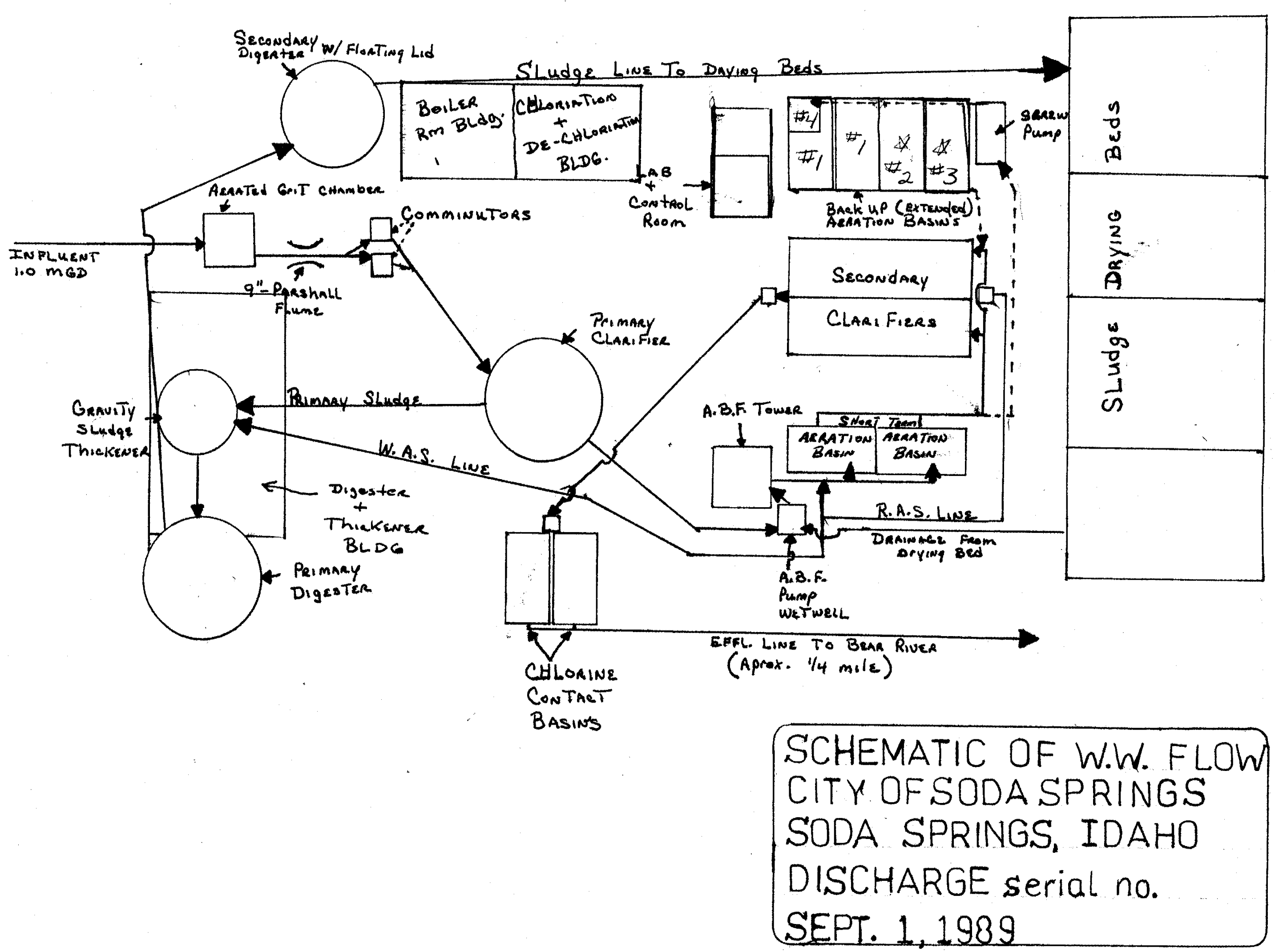
APPENDIX A

Waste Water Treatment Plant Location



APPENDIX B
Process Flow Diagram



<u>APPENDIX C</u>
Applicable Water Quality Standards

(A) <u>Water Quality Criteria</u>

The following water quality criteria are necessary for the protection of the designated used of the Bear River:

1. IDAPA 58.01.02.200.02 - Toxic Substances. Surface waters of the state shall be free from toxic substances in concentrations that impair designated beneficial uses. These substances do not include suspended sediment produced as a result of nonpoint source activities.

2. IDAPA 58.01.02.200.05 - Floating, Suspended or Submerged Matter. Surface waters of the state shall be free from floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses.

3. IDAPA 58.01.02.200.06 - Excess Nutrient. Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses.

4. IDAPA 58.01.02.200.07 - Oxygen-Demanding Materials. Surface waters of the state shall be free from oxygen-demanding materials in concentrations that would result in an anaerobic water condition.

5. IDAPA 58.01.02.200.08 - Sediment. Sediment shall not exceed quantities specified in section 250, or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Subsection 350.02.b.

6. IDAPA 58.01.02.250.01 - General Criteria. The following criteria apply to all aquatic life use designations:

   a. Hydrogen Ion Concentration (pH) values within the range of six point five (6.5) to nine point five (9.5);

   b. The total concentration of dissolved gas not exceeding one hundred and ten percent (110%) of saturation at atmospheric pressure at the point of sample collection;

c. Total chlorine residual.

i. One (1) hour average concentration not to exceed nineteen (19) μg/l.

ii. Four (4) day average concentration not to exceed eleven (11) μg/l.

7. IDAPA 58.01.02.250.02.a - Dissolved Oxygen Concentrations exceeding six (6) mg/l at all times.

8. IDAPA 58.01.02.250.02.b - Water temperatures of twenty-two (22) degrees C or less with a maximum daily average of no greater than nineteen (19) degrees C.

9. IDAPA 58.01.02.250.02.c - Ammonia.

i. One (1) hour average concentration of un-ionized ammonia (as N) is not to exceed (0.43/A/B/2) mg/l, where:

A=1 if the water temperature (T) is greater than or equal to 20 degrees C (if T>30 degrees C site-specific criteria should be defined), or

A=10 power (0.03(20-T)) if T is less than twenty (20) degrees C, and

B=1 if the pH is greater than or equal to 8 (if pH>9.0 site-specific criteria should be defined); or

B=(1+10 power (7.4-pH))/1.25 if pH is less than 9 (if pH<6.5 site-specific criteria should be defined)

ii. Four-day average concentration of un-ionized ammonia (as N) is not to exceed (0.66/A/B/C) mg/l, where:

A=1.4 if the water temperature (T) is greater than or equal to 15 degrees C (if T>30 degrees C site-specific criteria should be defined), or

A=10 power (0.03(20-T)) if T is less than fifteen (15) degrees C, and

B=1 if the pH is greater than or equal to 8 (if pH>9.0 site-specific criteria should be defined); or

B=(1+10 power (7.4-pH))/1.2 if pH is less than 8 (if pH<6.5 site-specific criteria should be defined), and

C=13.5 if pH is greater than or equal to 7.7, or

C=20(10 power (7.7-pH)/1+10 power (7.4-pH))) if the pH is less than 7.7.

10. IDAPA 58.01.02.250.d - Turbidity, below any applicable mixing zone set by the Department, shall not exceed background turbidity by more than fifty (50) NTU instantaneously or more than twenty-five (25) NTU for more than ten (10) consecutive days.

11. IDAPA 58.01.02.250.e. - Salmonid spawning: waters designated for salmonid spawning are to exhibit the characteristics during the spawning period and incuabion for the particular species inhabiting those waters:

    i. Dissolved Oxygen.

        (2) Water-Column Dissolved oxygen. One (1) day minimum of not less than six point zero (6.0) mg/l or ninety percent (90%) of saturation, whichever is greater.

    ii. Water temperatures of thirteen (13) degrees C or less with a maximum daily average no greater than nine (9) degrees C.

12. IDAPA 58.01.02.251.01 - Primary Contact Recreation. Waters designated for primary contact recreation are not to contain E.coli bacteria significant to the public health in concentrations exceeding:

    a. A single sample of four hundred six (406) E.coli organisms per one hundred (100) ml; or

    b. A geometric mean of one hundred twenty-six (126) E.coli organisms per one hundred (100)ml based on a minimum of five (5) samples taken every three (3) to five (5) days over a thirty (30) day period.

(B) <u>Antidegradation Policy</u>

The state of Idaho has adopted an anti-degradation policy as part of their water quality standard (IDAPA 58.01.02.051). The anti-degradation policy represents a three tiered approach to maintain and protect various levels of water quality and uses. The three tiers of protection are as follows:

1. Maintenance of Existing Uses for all Waters. The existing in stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

2. High Quality Waters. Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the Department finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the Department's continuing planning process, tat allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the Department shall assure water quality adequate to protect existing uses fully. Further, the Department shall assure that there shall be achieved the highest statutory and existing uses fully. Further, the Department shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and cost-effective and reasonable best management practices for nonpoint source control. In providing such assurance, the Department may enter together into an agreement with other state of Idaho or federal agencies in accordance with Sections 67-2326 through 67-2333, Idaho Code.

3. Outstanding Resource Waters. Where high quality waters constitute an outstanding national resource, such as waters of national and state parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected from the impacts of point and nonpoint source activities.

APPENDIX D
Basis for Effluent Limitations

(A) Effluent Limit Development

Effluent limitations are developed from technology available to treat the pollutants (technology-based limits) and limits that are protective of the designated uses of the receiving water (water quality-based limits). The proposed effluent limits in the draft permit will reflect whichever limits (technology-based or water quality-based) are more stringent. A discussion of the technology-based effluent limits is provided in Part B of this appendix, and Part C discusses water quality-based effluent limits. Part D of this appendix compares the technology-based effluent limits with the water quality-based effluent limits and summarizes the effluent limits that are proposed in the draft permit.

1. Technology-based Effluent Limits.

   The Clean Water Act requires Publicly Owned Treatment Works (POTWs) to meet performance-based requirements from available wastewater treatment technology. Section 301 of the Clean Water Act established a performance level, referred to as "secondary treatment," that all POTWs were required to meet by July 1, 1977. EPA developed secondary treatment regulations which are specified in 40 CFR 133. These technology-based limits apply to all POTWs and defines the minimum level of effluent quality attainable by secondary treatment. Additionally, the state of Idaho has established treatment requirements for point source sewage wastewater discharges (IDAPA 58.01.02.420) that applies to all sewage treatment facilities and their discharges. The draft permit is based on technology-based effluent limits for BOD_5, TSS, pH, fecal coliform bacteria, and total residual chlorine.

2. Water Quality-based Effluent Limits.

   a. Statutory Basis.

      Section 301(b)(1) of the Clean Water Act requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. Discharges to state waters must also comply with limitations imposed by the State as part of its certification of NPDES permits under section 401 of the Clean Water Act.

      The NPDES regulations at 40 CFR 122.44(d) implement section 301(b)(1) of the Clean Water Act and require that all effluents be characterized to determine the need for water quality-based effluent limits (WQBELs). In deciding whether or not WQBELs are needed to protect water quality, it must be determined whether the discharge causes, has the reasonable potential to cause, or contributes to an excursion of numeric or narrative water quality criteria (40 CFR 122.44(d)(1)).

Therefore, after technology-based effluent limits are applied to a discharge, an evaluation is made to project whether or not the discharge may exceed an applicable criterion from the water quality standards. A water quality-based effluent limit must be developed if it is projected that the technology-based effluent limits are not sufficient to meet the applicable water quality standards. Additionally, water quality-based effluent limits may be established for parameters which do not have technology-based limitations, but have been determined to exceed an applicable criterion from the water quality standards (e.g., ammonia, metals).

b. Mixing Zone.

The CWA allows mixing zones (or zones of dilution in the receiving water body) at the discretion of the State when their water quality standards permit them. The state of Idaho water quality standards allows the water quality criteria to be exceeded within a mixing zone authorized by IDEQ when the receiving water quality meets state water quality standards. The allowed mixing zones do not impair the integrity of the water body as a whole, do not allow lethality to organisms passing through, and do not pose any serious health risks considering likely pathways of exposure.

In the case of a state approved mixing zone, the wasteload allocation (WLA) is calculated as a mass balance, based on the available dilution, background concentrations, and the State approved water quality criteria. When the receiving water exceeds the criterion for the pollutant or the State has not authorized a mixing zone for a particular pollutant, there is no dilution available for the effluent and the State adopted criterion becomes the WLA.

The State has not authorized a mixing zone for the re-issuance of this permit. The EPA is proposing 25 percent dilution of the receiving water for aquatic life criteria in the draft permit when background concentrations do not exceed criteria. If the State does not authorize or amends the mixing zone in the final 401 certification of this permit, then the reasonable potential determination and permit limits will be re-calculated for the final permit.

c. Reasonable Potential Determination.

The CWA requires NPDES permitted discharges to demonstrate compliance with state water quality standards. In order to determine compliance with water quality standards, ambient (upstream) and effluent monitoring data are used in a mass balance equation to determine if the maximum observed effluent concentration has the potential to exceed chemical specific water quality criteria under critical stream conditions. If the projected downstream concentration has the potential to exceed the criteria, then a permit limit is developed for that pollutant.

Pollutants present in the effluent for which the State has not adopted numeric criteria, but which may be contributing to an excursion above a narrative criterion, must also be investigated to determine if permit limits are needed. In such cases, limits are established using one of three options: (1) use EPA's national criteria, (2) develop criteria, or (3) control the pollutant through the use of an indicator. Refer to Appendix C for a more detailed explanation of how reasonable potential is determined.

d. Procedure for Developing Wasteload Allocations.

The first step in developing water quality-based limits is to determine the wasteload allocation for each parameter and the time frame over which the wasteload allocations apply. In general, the period over which a wasteload allocation applies is based on the length of time the target organism can be exposed to the pollutant without adverse effect. For example, aquatic life criteria generally apply as one-hour averages (acute criteria) or four-day averages (chronic criteria). A wasteload allocation can be developed from a Total Maximum Daily Load (TMDL) for an impaired water body, a criterion with a mixing zone authorized by the State, or a criterion.

(1) TMDL-based Wasteload Allocation. Section 303(d) of the Clean Water Act requires states to develop TMDLs for water bodies that will not meet water quality standards. A TMDL is a determination of the amount of a pollutant from point sources, nonpoint sources, and natural background, including a margin of safety, that may be discharged to a water body without causing the water body to exceed the criterion for that pollutant. The TMDL provides wasteload allocations for all point sources discharging to that water body. Federal regulations at 40 CFR 122.44(d)(vii) require effluent limitations in NPDES permits to be consistent with the assumptions and requirement of any available wasteload allocation prepared by the State and approved by EPA. The TMDL for the

Bear River has not been completed, therefore, there are no TMDL-based wasteload allocations for the draft permit.

(2) Mixing Zone-based Wasteload Allocation. When the State authorizes a mixing zone for the discharge, the wasteload allocation is calculated by using a simple mass balance equation. The equation takes into account the available dilution provided by the mixing zone and the background concentrations of the pollutant. Establishing a wasteload allocation using the criterion and a mixing zone ensures that the permittee will not contribute to an exceedance of the water quality standards at the edge of the mixing zone. The wasteload allocations for total residual chlorine are based on a mixing zone and the numeric criteria in Idaho's water quality standards.

(3) Criterion-based Wasteload Allocation. In some cases a mixing zone cannot be authorized, either because the receiving water already exceeds the criteria or the receiving water flow is too low to provide dilution. In such cases, the criterion becomes the wasteload allocation. Establishing the criterion as the wasteload allocation ensures that the permittee will not contribute to an exceedance of the water quality standards. The wasteload allocations for ammonia are based on the numeric criteria in Idaho's water quality standards.

e. Water Quality-based Effluent Limits.

Once the wasteload allocations have been developed, EPA uses the procedures in the Technical Support Document (TSD; EPA, 1991) to statistically convert them to monthly average, and weekly average, or maximum daily permit limits. This approach takes into account effluent variability, sampling frequency, and water quality standards.

3. Mass-based limits.

Federal regulations at 40 CFR 122.45(f) require all pollutants limit in permits to be expressed in terms of mass except for pH, temperature, radiation, or other pollutants which cannot appropriately be expressed as mass. Mass loading limits (lbs/day) are calculated by multiplying the concentration limit (mg/l) by the design flow (1.7 mgd) and a conversion factor of 8.34.

(B) <u>Technology-based Effluent Limits</u>

1. Five-day Biochemical Oxygen Demand (BOD_5) [40 CFR 133.102(a)].

    a. Monthly average limit = 30 mg/l (430 lbs/day).

    b. Weekly average limit = 45 mg/l (640 lbs/day).

    c. The monthly average effluent concentration must not exceed 15 percent of the monthly average influent concentration.

2. Total Suspended Solids (TSS) [40 CFR 133.102(b)].

    a. Monthly average limit = 30 mg/l (430 lbs/day).

    b. Weekly average limit = 45 mg/l (640 lbs/day).

    c. The monthly average effluent concentration must not exceed 15 percent of the monthly average influent concentration.

3. pH [40 CFR 133.102(c)].

    The effluent values for pH shall be maintained within the limits of 6.0 and 9.0.

4. Fecal Coliform Bacteria [IDAPA 58.01.02.420.05.a].

    Weekly Average limit = 200 colonies/100 ml*.
    *based on the geometric mean of all samples collected during the week.

5. Total Residual Chlorine. The monthly average technology-based effluent limitation of 0.5 mg/l is derived from standard operating practices (WPCF, 1976). These practices indicate that "satisfactory disinfection of secondary wastewater effluents generally can be obtained when the chlorine residuals after 15 to 30 minutes of contact are between 0.2 and 1.0 mg/l. A residual of 0.5 mg/l after 15 minutes of contact appears to be a reasonable average."

    Monthly average limit = 0.5 mg/l (7 lbs/day).

(C) Water Quality-based Effluent Limits

1. Floating, Suspended or Submerged Matter [IDAPA 58.01.02.200.05].

   The permittee must not discharge any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water.

2. E. Coli Bacteria [IDAPA 58.01.02.250.01].

   Monthly average limit = 126 organisms/100 ml*.
   *based on the geometric mean of all samples collected during the month.

   Daily maximum limit = 406 organisms/100 ml.

3. pH [IDAPA 58.01.02.250.01.a].

   The effluent pH values must be between 6.5 and 9.5.

4. Ammonia, total as N [IDAPA 58.01.02.250.02.c].

   Monthly average limit = 2.1 mg/l (30 lbs/day)

   Daily maximum limit = 2.8 mg/l (40 lbs/day)

5. Total residual chlorine [IDAPA 58.01.02.250.01.c].

   Monthly average limit = 0.093 mg/l (1.3 lbs/day)

   Daily maximum limit = 0.210 mg/l (3.0 lbs/day)

(D) Water Quality-based Effluent Limit Calculations

1. Ammonia

Step 1: Is there reasonable potential to exceed water quality standards?

Table D.1: Reasonable Potential Analysis for Ammonia			
Acute Aquatic Life	Nomenclature	Value	Units
criterion (pH = 7.5, Temp. = 14°C)		**2.2**	mg/L
projected receiving water concentration $C_d=(Q_eC_e+Q_uC_u)\div(Q_e+Q_u)$	C_d	**9.1**	mg/L
design flow	Q_e	1.7	mgd
maximum projected effluent concentration C_e = MEC · RPM	C_e	9.1	mg/L
maximum effluent concentration	MEC	8.24	mg/L
reasonable potential multiplier $RPM=\exp[2.326\sigma-0.5\sigma^2]\div\exp[z\sigma-0.5\sigma^2]$	RPM	1.1	
popular variance $\sigma^2 = \ln(CV^2+1)$	σ^2	0.039	
coefficient of variation (CV) = s ÷ μ	CV	0.2	
standard deviation of data	s	0.64	
mean of data	μ	2.6	
standard deviation (σ) = $(\sigma^2)^{0.5}$	σ	0.20	
z-score (statistics tables)	z	1.83	
percentile (99% confidence level) $p_n = (1-0.99)^{1/n}$	p_n	0.9667	
number of data points	n	136	
upstream flow Q_u = 1Q10 · dilution	Q_u	0	mgd
acute critical flow	1Q10	68	mgd
dilution[1]		0	%
upstream concentration	C_u	3.5	mg/L

Footnotes:
1 No dilution is available because the upstream concentration exceeds the chronic criterion.

The projected receiving water concentration (C_d) is greater than the acute aquatic life criterion, thus, there is reasonable potential to violate this water quality standard.

Table D.2: Reasonable Potential Analysis for Ammonia			
Chronic Aquatic Life	Nomenclature	Value	Units
criterion (pH = 7.5, Temp. = 14°C)		**2.2**	mg/L
projected receiving water concentration $C_d=(Q_eC_e+Q_uC_u)\div(Q_e+Q_u)$	C_d	**9.1**	mg/L
design flow	Q_e	1.7	mgd
maximum projected effluent concentration C_e = MEC · RPM	C_e	9.1	mg/L
maximum effluent concentration	MEC	8.24	mg/L
reasonable potential multiplier $RPM=\exp[2.326\sigma-0.5\sigma^2]\div\exp[z\sigma-0.5\sigma^2]$	RPM	1.1	
popular variance $\sigma^2 = \ln(CV^2+1)$	σ^2	0.039	
coefficient of variation $CV = s \div \mu$	CV	0.2	
standard deviation of data	s	0.64	
mean of data	μ	2.6	
standard deviation $\sigma = (\sigma^2)^{0.5}$	σ	0.20	
z-score (statistics tables)	z	1.83	
percentile (99% confidence level) $p_n = (1-0.99)^{1/n}$	p_n	0.9667	
number of data points	n	136	
upstream flow Q_u = 7Q10 · dilution	Q_u	0	mgd
chronic critical flow	7Q10	77	mgd
dilution[1]		0	%
upstream concentration	C_u	3.5	mg/L

Footnotes:
1 No dilution is available because the upstream concentration exceeds the chronic criterion.

The projected receiving water concentration (C_d) is greater than the chronic aquatic life criterion, thus, there is reasonable potential to violate this water quality standard.

Step 2: Calculate Waste Load Allocations (WLAs) for each criterion with reasonable potential

Table D.3: Waste Load Allocation Calculations for Ammonia			
Acute Aquatic Life	Nomenclature	Value	Units
wasteload allocation $WLA=C_e = [C_d(Q_e+Q_u)-Q_uC_u]\div Q_e$	$WLA_{a,c}$	**14.9**	mg/L
acute criterion	C_d	14.9	mg/L
average annual effluent flow	Q_e	1.7	mgd
upstream flow Q_u = 1Q10 · dilution	Q_u	0	mgd
acute critical flow	1Q10	68	mgd
dilution[1]		0	%
upstream concentration	C_u	3.5	mg/L
Chronic Aquatic Life			
wasteload allocation $WLA=C_e = [C_d(Q_e+Q_u)-Q_uC_u]\div Q_e$	$WLA_{a,c}$	**2.2**	mg/L
chronic criterion	C_d	2.2	mg/L
average annual effluent flow	Q_e	1.7	mgd
upstream flow Q_u = 7Q10 · dilution	Q_u	0	mgd
chronic critical flow	7Q10	77	mgd
dilution[1]		0	%
upstream concentration	C_u	3.5	mg/L
Footnotes: 1 No dilution is available because the upstream concentration exceeds the chronic criterion.			

Step 3: Calculate effluent limitations

Table D.4: Effluent Limitation Calculations for Ammonia			
Aquatic Life	Nomenclature	Value	Units
maximum daily limit $MDL = LTA \cdot exp[z_{99}\sigma - 0.5\sigma^2]$	MDL	**2.8**	mg/L
maximum daily loading loading (lbs/day) = MDL(mg/L)$\cdot Q_e \cdot$8.34		**40**	lbs/day
average monthly limit $AML = LTA \cdot exp[z_{95}\sigma_n - 0.5\sigma_n^2]$	AML	**2.1**	mg/L
average monthly loading loading (lbs/day) = AML(mg/L)$\cdot Q_e \cdot$8.34		**30**	lbs/day
design flow	Q_e	1.7	mgd
lowest long term average	LTA	1.8	
acute long term average $LTA_{a,c} = WLA_{a,c} \cdot exp[0.5\sigma^2 - z_{99}\sigma]$	$LTA_{a,c}$	9.5	
acute wasteload allocation	$WLA_{a,c}$	14.9	
z-score (99th percentile)	z_{99}	2.326	
popular variance $\sigma^2 = ln(CV^2+1)$	σ^2	0.039	
coefficient of variation (CV) = s ÷ μ	CV	0.2	
standard deviation of data	s	0.64	
mean of data	μ	2.6	
standard deviation $\sigma = (\sigma^2)^{0.5}$	σ	0.20	
chronic long term average $LTA_c = WLA_c \cdot exp[0.5\sigma_4^2 - z_{99}\sigma_4]$	LTA_c	1.8	
chronic wasteload allocation	WLA_c	2.2	
$\sigma_4^2 = ln[(CV^2 \div 4) + 1]$	σ_4^2	0.010	
$\sigma_4 = (\sigma_4^2)^{0.5}$	σ_4	0.10	
z-score (95th percentile)	z_{95}	1.645	
$\sigma_n^2 = ln[(CV^2 \div n)+1]$	σ_n^2	0.0050	
number of samples required per month	n	8	
$\sigma_n = (\sigma_n^2)^{0.5}$	σ_n	0.071	

Total Residual Chlorine

Step 1: Is there reasonable potential to exceed water quality standards?

Table D.5: Reasonable Potential Analysis for Total Residual Chlorine			
Acute Aquatic Life	Nomenclature	Value w/dilution	Units
criterion		**19**	µg/L
projected receiving water concentration $C_d=(Q_eC_e+Q_uC_u)\div(Q_e+Q_u)$	C_d	**45**	µg/L
design flow	Q_e	1.7	mgd
maximum projected effluent concentration (technology-based limitation)	C_e	500	µg/L
upstream flow Q_u = 1Q10 · dilution	Q_u	17	mgd
acute critical flow	1Q10	68	mgd
dilution		25	%
upstream concentration	C_u	0	µg/L

The projected receiving water concentration (C_d) is greater than the acute aquatic life criterion, thus, there is reasonable potential to violate this water quality standard.

Table D.6: Reasonable Potential Analysis for Total Residual Chlorine			
Chronic Aquatic Life	Nomenclature	Value w/dilution	Units
criterion		**11**	µg/L
projected receiving water concentration $C_d=(Q_eC_e+Q_uC_u)\div(Q_e+Q_u)$	C_d	**41**	µg/L
design flow	Q_e	1.7	mgd
maximum projected effluent concentration (technology-based limitation)	C_e	500	µg/L
upstream flow Q_u = 7Q10 · dilution	Q_u	19	mgd
chronic critical flow	7Q10	77	mgd
dilution		25	%
upstream concentration	C_u	0	µg/L

The projected receiving water concentration (C_d) is greater than the chronic aquatic life criterion, thus, there is reasonable potential to violate this water quality standard.

Step 2: Calculate Waste Load Allocations (WLAs) for each criterion with reasonable potential

Table D.7: Waste Load Allocation Calculations for Total Residual Chlorine			
Acute Aquatic Life	Nomenclature	Value w/dilution	Units
wasteload allocation $WLA=C_e = [C_d(Q_e+Q_u)-Q_uC_u]÷Q_e$	$WLA_{a,c}$	**210**	µg/L
acute criterion	C_d	19	µg/L
average annual effluent flow	Q_e	1.7	mgd
upstream flow Q_u = 1Q10 · dilution	Q_u	17	mgd
acute critical flow	1Q10	68	mgd
dilution		25	%
upstream concentration	C_u	0	µg/L
Chronic Aquatic Life			
wasteload allocation $WLA=C_e = [C_d(Q_e+Q_u)-Q_uC_u]÷Q_e$	$WLA_{a,c}$	**130**	µg/L
chronic criterion	C_d	11	µg/L
average annual effluent flow	Q_e	1.7	mgd
upstream flow Q_u = 7Q10 · dilution	Q_u	19	mgd
chronic critical flow	7Q10	77	mgd
dilution		25	%
upstream concentration	C_u	0	µg/L

Step 3: Calculate effluent limitations

Table D.8: Effluent Limitation Calculations for Total Residual Chlorine			
Aquatic Life	Nomenclature	Value w/dilution	Units
maximum daily limit $MDL = LTA \cdot exp[z_{99}\sigma - 0.5\sigma^2]$	MDL	**210**	µg/L
maximum daily loading loading (lbs/day) = $MDL(mg/L) \cdot Q_e \cdot 8.34$		**3.0**	lbs/day
average monthly limit $AML = LTA \cdot exp[z_{95}\sigma_n - 0.5\sigma_n^2]$	AML	**93**	µg/L
average monthly loading loading (lbs/day) = $AML(mg/L) \cdot Q_e \cdot 8.34$		**1.3**	lbs/day
design flow	Q_e	1.7	mgd
lowest long term average	LTA	78	
acute long term average $LTA_{a,c} = WLA_{a,c} \cdot exp[0.5\sigma^2 - z_{99}\sigma]$	$LTA_{a,c}$	78	
acute wasteload allocation	$WLA_{a,c}$	210	
z-score (99th percentile)	z_{99}	2.326	
popular variance $\sigma^2 = ln(CV^2+1)$	σ^2	0.22	
coefficient of variation (CV) = s ÷ µ	CV	0.5	
standard deviation of data	s	0.0088	
mean of data	µ	0.017	
standard deviation $\sigma = (\sigma^2)^{0.5}$	σ	0.47	
chronic long term average $LTA_c = WLA_c \cdot exp[0.5\sigma_{20}^2 - z_{99}\sigma_{20}]$	LTA_c	100	
chronic wasteload allocation	WLA_c	130	
$\sigma_{20}^2 = ln[(CV^2 \div 20) + 1]$	σ_{20}^2	0.012	
$\sigma_{20} = (\sigma_{20}^2)^{0.5}$	σ_{20}	0.11	
z-score (95th percentile)	z_{95}	1.645	
$\sigma_n^2 = ln[(CV^2 \div n)+1]$	σ_n^2	0.012	
number of samples required per month	n	20	
$\sigma_n = (\sigma_n^2)^{0.5}$	σ_n	0.11	

(E) Comparison of Technology-based and Water Quality-based Effluent Limits

Table D.9: Most Stringent Average Monthly Limits - Technology vs. Water Quality

Parameter	Technology-based	Water Quality-based	Most Stringent
BOD_5	30 mg/l (430 lbs/day) 85% removal	---	30 mg/l (430 lbs/day) 85% removal
TSS	30 mg/l (430 lbs/day) 85% removal	---	30 mg/l (430 lbs/day) 85% removal
Fecal Coliform Bacteria	---	---	---
E. Coli Bacteria	---	126 organisms/100 ml	126 organisms/100 ml
Total Ammonia as N	---	2.1 mg/l (30 lbs/day)	2.1 mg/l (30 lbs/day)
Total Residual Chlorine	0.5 mg/l (7 lbs/day)	0.093 mg/l (1.3 lbs/day)	0.093 mg/l (1.3 lbs/day)

Table D.10: Most Stringent Average Weekly Limits - Technology vs. Water Quality

Parameter	Technology-based	Water Quality-based	Most Stringent
BOD_5	45 mg/l (640 lbs/day)	---	45 mg/l (640 lbs/day)
TSS	45 mg/l (640 lbs/day)	---	45 mg/l (640 lbs/day)
Fecal Coliform Bacteria	200 colonies/100 ml	---	200 colonies/100 ml
E. Coli Bacteria	---	---	---
Total Ammonia as N	---	---	---
Total Residual Chlorine	---	---	---

Table D.11: Most Stringent Maximum Daily Limits - Technology vs. Water Quality

Parameter	Technology-based	Water Quality-based	Most Stringent
BOD_5	---	---	---
TSS	---	---	---
Fecal Coliform Bacteria	---	---	---
E. Coli Bacteria	---	406 organisms/100 ml	406 organisms/100 ml
Total Ammonia as N	---	2.8 mg/l (40 lbs/day)	2.8 mg/l (40 lbs/day)
Total Residual Chlorine	---	0.209 mg/l (3.0 lbs/day)	0.209 mg/l (3.0 lbs/day)
pH	6.0 to 9.0	6.5 to 9.5	6.5 to 9.0

<u>APPENDIX E</u>
Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to request a consultation with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service regarding potential effects an action may have on listed endangered species.

The U.S. Fish and Wildlife Service not listed any species as endangered in the vicinity of this action. They have listed the Canada lynx *(Lynx canadensi*s), the Bald eagle *(Haliaeetus leucocephalu*s), and the Ute ladies'- tresses *(Spiranthes diluviali*s) as threatened species. Additionally, the Gray wolf *(Canis lupu*s) and the Whooping crane (Grus americana) have been listed as experimental, non-essential population in this area. The National Oceanic and Atmospheric Administration, National Marine Fisheries Service has not listed any species as threatened or endangered in the vicinity of this action.

EPA has determined that the requirements contained in the draft permit will not have an impact on the Canada lynx, gray wolf, bald eagle, whooping crane, or Ute ladies' - tresses. Hunting, loss of habitat through a variety of human activities, lead poisoning, and application of pesticides (esp. DDT) have been identified as the primary causes for the decline of these species. The issuance of an NPDES permit to the City of Soda Springs waste water treatment plant will not result in habitat destruction, nor will it result in changes in population that could result in increased habitat destruction. Furthermore, issuance of this permit will not impact the food sources for these species.