STATEMENT OF BASIS

Applicant:	City of Parker
Permit Number:	SD0020940
Contact Person:	Ron Nelson, Mayor Travis Friman, Water and Wastewater Superintendent PO Box 265 Parker, SD 57053-0265
Phone:	(605) 297-4453
Permit Type:	Minor Municipal - Renewal

This document is intended to explain the basis for the requirements contained in the proposed Surface Water Discharge Permit. This document provides guidance to aid in complying with the permit regulations. This guidance is not a substitute for reading the proposed permit and understanding its requirements.

DESCRIPTION

The city of Parker operates a wastewater treatment facility (WWTF) located about one-half mile northeast of the city in the Northeast ¼ of Section 8, Township 99 North, Range 53 West, in Turner County, South Dakota (Latitude 43.408101º, Longitude -97.124745º - Navigational Quality GPS).

The WWTF consists of collection system that is primarily gravity flow aided by 4 area lift stations which flows to a main lift station located north of the city. Wastewater is then pumped to a three-cell stabilization pond system. The original two-cell stabilization pond system was constructed in 1971, with the addition of the third cell in 1990. The wastewater facility is operated in series and the influent can be split between Cell 1 and Cell 2, which are each 5.5 acres in size. Wastewater from Cell 2 enters Cell 3, which is 3.0 acres in size. Any discharge from this wastewater treatment facility occurs from Cell 3 through a 10-inch gate valve. A 60º V-notch weir is used for effluent flow measurement.

This WWTF serves a population of 1,022 (2010 census), with no known industrial users contributing flow to the system.

RECEIVING WATERS

Any discharge from this facility will enter the West Fork Vermillion River, which is classified by the South Dakota Surface Water Quality Standards (SDSWQS), Administrative Rules of South Dakota (ARSD), Section 74:51:03:01 and 74:51:03:25 for the following beneficial uses:

(6) Warmwater marginal fish life propagation waters;
(8) Limited contact recreation waters;
(9) Fish and wildlife propagation, recreation, and stock watering waters; and
(10) Irrigation waters.

The West Fork Vermillion River flows about four miles to the Vermillion River, which is classified by the SDSWQS, ARSD Section 74:51:03:01 and 74:51:03:25 for the following beneficial uses:

(5) Warmwater semipermanent fish life propagation waters;
(8) Limited contact recreation waters;
(9) Fish and wildlife propagation, recreation, and stock watering waters; and
(10) Irrigation waters.

ANTIDEGRADATION

SDDENR has fulfilled the antidegradation review requirements for this permit. In accordance with South Dakota's Antidegradation Implementation Procedure and the SDSWQS, no further review is required. The results of SDDENR's review are included in Attachment 1.

MONITORING DATA

The city of Parker has submitting Discharge Monitoring Reports (DMRs) under the current permit. As shown in Attachment 2, this facility has had one 30-Day average violation of Five-Day Biochemical Oxygen Demand (BOD_5), two 30-Day average violations of ammonia and three daily maximum violations of ammonia during the current permit cycle. However, these violations seem to be isolated incidences and do not reflect the overall treatment performance of this facility. No future violations are expected. No discharge was reported for the months not included in the table.

INSPECTIONS

Personnel from SDDENR conducted a *Compliance Inspection* of the city of Parker's wastewater treatment facility on May 6, 2010.

The following comments and corrective actions are ***required*** in order to come into compliance with the town's Surface Water Discharge permit.

COMMENTS	REQUIRED CORRECTIVE ACTIONS
The City of Parker has not been making copies of DMRs before they are mailed to Pierre; copies have not been kept since switching from carbon copy DMRs.	On page 10 of your SWD permit, Section 2.10 *Retention of Records* states "Data collected on site, copies of Discharge Monitoring Reports, and a copy of this permit must be maintained on site during the duration of activity at the permitted location". This section also states records are required to be kept for three years from the date of the sample, measurement,

COMMENTS	REQUIRED CORRECTIVE ACTIONS
	report, or application. The city must keep copies of all DMRs and other records for at least three years.
The operator is correctly calibrating the pH meter. However, a pH meter calibration log is not being kept.	A pH meter calibration log must be kept. This log needs to include the date, time, initials of the person calibrating the meter, the calibrated meter readings for the 7.0 and 10.0 buffer solutions, and the expiration date of the buffer solutions.

The following comments and corrective actions are ***recommended*** and are items that will improve the operation of your facility.

COMMENTS	RECOMMENDED CORRECTIVE ACTIONS
The warning signs surrounding the wastewater treatment facility have faded.	These warning signs should be repainted or replaced. ***Note:*** At the time of the inspection, the operator mentioned having already ordered new signs from Lyle Signs in Sioux Falls.
There was some weed growth along the pond dikes; however, most of it was already dead and taken care of.	This unwanted vegetation needs to be eliminated to prevent dike damage from erosion and the root systems of these plants. This vegetation also tends to inhibit the air action on the pond(s), which in turn inhibits the biological action necessary to treat the wastewater and keep odors to a minimum. Once the weeds are eliminated, the pond site should be reseeded with an appropriate grass.

EFFLUENT LIMITS

SDDENR is required by EPA and the federal Clean Water Act to review and revise its surface water quality standards at least every three years. On March 11, 2009, the South Dakota Board of Water Management approved SDDENR's latest triennial review of the South Dakota Surface Water Quality Standards. As part of this review, SDDENR added surface water quality standards for *Escherichia coli* (*E. coli*). ARSD Section 74:51:01:51 includes numeric criteria for both fecal coliform and *E. coli*. SDDENR intends to phase in the implementation of the *E. coli* standards.

During the reissuance of surface water discharge permits, permittees that are currently required to meet fecal coliform limits will be given time to meet the new *E. coli* limits. Therefore, interim limits for fecal coliform will be initially included in the proposed permit, with a requirement to meet the new *E. coli* limits by May 1, 2014.

Interim Effluent Limits

Effective immediately and lasting through **April 30, 2014**, the permittee shall comply with the interim effluent limits below.

No discharge shall occur from this facility until permission is granted by SDDENR. The permittee shall comply with the effluent limits specified below. This requirement is included in the permit because the discharge reaches a stream classified as a fishery. During any discharge, the permittee shall comply with the effluent limits specified below, which are based on the Secondary Treatment Standards (ARSD Section 74:52:06:03), the SDSWQS, Best Professional Judgment (BPJ), and the current permit limits.

Outfall 001 – Any discharge from the discharge structure in Cell 3 to the West Fork Vermillion River (Latitude 43.409083°, Longitude -97.123525°, map interpolation).

1. The Five-day Biochemical Oxygen Demand (BOD_5) concentration shall not exceed 30 mg/L (30-day average) or 45 mg/L (7-day average). These limits are based on the Secondary Treatment Standards.

2. The Total Suspended Solids (TSS) concentration shall not exceed 90 mg/L (30-day average) or 135 mg/L (7-day average). These limits are based on Secondary Treatment Standards, the warmwater marginal fish life propagation waters classification of the West Fork Vermillion River, and current permit limits.

   Note: ARSD Section 74:52:06:04(2) allows TSS limits less stringent than Secondary Treatment Standards if it can be demonstrated that:

   a) Waste stabilization ponds are the principal process used for secondary treatment;
   b) Operation and maintenance data indicate that TSS values specified in subdivision 74:52:06:03(3) cannot be achieved;
   c) The effluent quality for TSS does not exceed 110 mg/L for 30-day average and 165 mg/L for 7-day average; and
   d) The POTW is achieving levels of effluent quality required for BOD_5 specified in Section 74:52:06:03.

   Because the facility meets the above criteria, the TSS variance is allowed. However, since the Vermillion River is classified as a warmwater semipermanent fishery, the TSS limits will be 90 mg/L (30-day average) and 135 mg/L (7-day average) to ensure the discharge does not impair the beneficial uses of the Vermillion River.

3. The pH shall not be less than 6.5 standard units or greater than 9.0 standard units in any single analysis and/or measurement. These limits are based on warmwater semipermanent fish life propagation waters classification of the Vermillion River, the SDSWQS (ARSD Section 74:51:01:48), and current permit limits.

   Note: SDDENR specifies that pH analyses are to be conducted within 15 minutes of sample collection with a pH meter. Therefore, the permittee must have the ability to conduct onsite pH analyses. The pH meter used must be capable of simultaneous calibration to two points on the pH scale that bracket the expected pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment. Readings shall be reported to the nearest 0.1 standard units.

4. Fecal Coliform organisms from May 1 to September 30 shall not exceed a concentration of 1,000 per 100 milliliters as a geometric mean based on a minimum of five samples obtained during separate 24-hour periods for any 30-day period. *This limit is applicable only if five or more samples are taken and is only effective from May 1 to September 30.*

   In addition, fecal coliform organisms shall not exceed 2,000 per 100 milliliters in any one sample from May 1 to September 30. These limits are based on the limited contact recreation waters classification of the Vermillion River and the SDSWQS (ARSD Section 74:51:01:51).

5. The ammonia-nitrogen concentration shall not exceed the limits specified in the table below. These limits are based on the warmwater marginal fish life propagation waters classification of the West Fork Vermillion River, the SDSWQS (ARSD Section 74:51:01:49), the current permit limits, and BPJ. See Attachment 3 for more detail.

Month	**Ammonia Limit (as N)**	
	30-Day Average (mg/L)	**Daily Maximum (mg/L)**
January 1 – January 31	5.5	10.1
February 1 – February 29	5.5	10.1
March 1 – March 31	5.5	10.1
April 1 – April 30	2.8	6.0
May 1 – May 31	1.0	1.1
June 1 – June 30	1.0	1.1
July 1 – July 31	1.0	1.1
August 1 – August 31	1.0	1.1
September 1 – September 30	1.0	1.1
October 1 – October 31	2.5	4.4
November 1 – November 30	5.5	10.1
December 1 – December 31	5.5	10.1

6. No chemicals, such as chlorine, shall be used without prior written permission. This limit is based on BPJ.

Effluent water temperature (°C), flow rate (MGD), total flow (million gallons), duration of discharge (days), and *E. coli (no./100mL)* shall be monitored, but will not have a limit.

Final Effluent Limits

Effective **May 1, 2014**, and lasting through the life of the permit, the permittee shall comply with the final effluent limits below.

No discharge shall occur from this facility until permission is granted by SDDENR. The permittee shall comply with the effluent limits specified below. This requirement is included in the permit because the discharge reaches a stream classified as a fishery. During any discharge, the permittee shall comply with the effluent limits specified below which are based on the Secondary Treatment Standards (ARSD Section 74:52:06:03), the SDSWQS, BPJ, and the current permit limits.

1. The five-day Biochemical Oxygen Demand (BOD_5) concentration shall not exceed 30 mg/L (30-day average) or 45 mg/L (7-day average). These limits are based on the Secondary Treatment Standards.

2. The Total Suspended Solids (TSS) concentration shall not exceed 90 mg/L (30-day average) or 135 mg/L (7-day average). These limits are based on Secondary Treatment Standards, the warmwater marginal fish life propagation waters classification of the West Fork Vermillion River, and current permit limits.

   Note: ARSD Section 74:52:06:04(2) allows TSS limits less stringent than Secondary Treatment Standards if it can be demonstrated that:

   a) Waste stabilization ponds are the principal process used for secondary treatment;
   b) Operation and maintenance data indicate that TSS values specified in subdivision 74:52:06:03(3) cannot be achieved;
   c) The effluent quality for TSS does not exceed 110 mg/L for 30-day average and 165 mg/L for 7-day average; and
   d) The POTW is achieving levels of effluent quality required for BOD_5 specified in Section 74:52:06:03.

   Because the facility meets the above criteria, the TSS variance is allowed. However, since the Vermillion River is classified as a warmwater semipermanent fishery, the TSS limits will be 90 mg/L (30-day average) and 135 mg/L (7-day average) to ensure the discharge does not impair the beneficial uses of the Vermillion River, in accordance with SDDENR's policy.

3. The pH shall not be less than 6.5 standard units or greater than 9.0 standard units in any single analysis and/or measurement. These limits are based on the warmwater semipermanent fish life propagation waters classification of the Vermillion River, the SDSWQS (ARSD 74:51:01:25), and current permit limits.

   Note: SDDENR specifies that pH analyses are to be conducted within 15 minutes of sample collection with a pH meter. Therefore, the permittee must have the ability to conduct onsite pH analyses. The pH meter used must be capable of simultaneous calibration to two points on the pH scale that bracket the expected pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment. Readings shall be reported to the nearest 0.1 standard units.

4. The *Escherichia coli* (*E. coli*) organisms shall not exceed a concentration of 630 per 100 milliliters as a geometric mean based on a minimum of five samples obtained during separate 24-hour periods for any 30-day period. *This limit is only applicable if five or more samples are taken and is only effective from May 1 to September 30.*

   In addition, the *E. coli* organisms shall not exceed 1,178 per 100 milliliters in any one sample from May 1 to September 30. These limits are based on the limited-contact recreation beneficial use classification of the Vermillion River and the SDSWQS (ARSD Section 74:51:01:51).

5. The ammonia-nitrogen concentration shall not exceed the limits specified in the table below. These limits are based on the warmwater marginal fish life propagation waters classification of the West Fork Vermillion River, the SDSWQS (ARSD Section 74:51:01:49), the current permit limits, and BPJ. See Attachment 3 for more detail.

Month	**Ammonia Limit (as N)**	
	30-Day Average (mg/L)	**Daily Maximum (mg/L)**
January 1 – January 31	5.5	10.1
February 1 – February 29	5.5	10.1
March 1 – March 31	5.5	10.1
April 1 – April 30	2.8	6.0
May 1 – May 31	1.0	1.1
June 1 – June 30	1.0	1.1
July 1 – July 31	1.0	1.1
August 1 – August 31	1.0	1.1
September 1 – September 30	1.0	1.1
October 1 – October 31	2.5	4.4
November 1 – November 30	5.5	10.1
December 1 – December 31	5.5	10.1

6. No chemicals, such as chlorine, shall be used without prior written permission. This limit is based on BPJ.

Effluent water temperature (°C), flow rate (MGD), total flow (million gallons), and duration of discharge (days) shall be monitored, but will not have a limit.

SELF MONITORING REQUIREMENTS

Pre-Discharge Self-Monitoring

Prior to requesting permission to discharge, the permittee shall collect a grab sample from each lagoon cell that will be discharged and have the sample analyzed for BOD_5, Total Suspended Solids, pH, temperature, fecal coliform (through **April 30, 2014)**, *E. coli*, and ammonia-nitrogen. The results of the analyses, along with a request to discharge, shall be submitted to SDDENR. The request to discharge shall explain why a discharge is needed, when the discharge would start, the expected duration of the discharge, and the approximate volume of water to be discharged. The estimated flow condition of the receiving water shall also be reported (i.e. dry, low, normal, high). **No discharge shall occur until permission has been granted by SDDENR.**

Interim Self-Monitoring Requirements

As a minimum, upon the effective date of this permit through **April 30, 2014**, the following parameters shall be monitored at the frequency and with the type of measurement indicated; samples or measurements shall be representative of the volume and nature of the monitored discharge.

Effluent Characteristic	Frequency	Reporting Values[1]	Sample Type[1]
Duration of Discharge, days	Monthly	Monthly Total[2]	Calculate
Total Flow, million gallons	Monthly	Monthly Total	Calculate
Flow Rate, MGD	At least three per discharge[3]	Daily Maximum; 30-Day Average	Instantaneous

[1] See Definitions.

[2] The date and time of the start and termination of each discharge shall also be reported in the comment section of the DMR.

[3] A minimum of three samples shall be taken during any discharge. A sample shall be taken at the beginning, middle, and end of the discharge if the discharge is less than one week in duration. If a single, continuous discharge is greater than one week in duration, three samples shall be taken the first week and one each following week. All of the samples collected during the 7-day or 30-day period are to be used in determining the averages. The permittee always has the option of collecting additional samples if appropriate.

Effluent Characteristic	Frequency	Reporting Values[1]	Sample Type[1]
pH, standard units	At least three per discharge[3]	Daily Minimum; Daily Maximum	Instantaneous[4, 5]
Water Temperature, °C	At least three per discharge[3]	Daily Maximum; 30-Day Average	Instantaneous[5, 6]
Five-Day Biochemical Oxygen Demand (BOD_5), mg/L	At least three per discharge[3]	Max 7-Day Average; 30-Day Average	Grab
Total Suspended Solids (TSS), mg/L	At least three per discharge[3]	Max 7-Day Average; 30-Day Average	Grab
Ammonia-Nitrogen (as N), mg/L	At least three per discharge[3]	Daily Maximum; 30-Day Average	Grab[5]
Fecal Coliform, no./100 mL	At least three per discharge[3, 7]	Daily Maximum; 30-Day Geo Mean	Grab
E. coli, no./100 mL	At least three per discharge[3, 7]	Daily Maximum; 30-Day Geo Mean	Grab

[4] The pH shall be taken within 15 minutes of sample collection with a pH meter. The pH meter must be capable of simultaneous calibration to two points on the pH scale that bracket the expected pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment. Readings shall be reported to the nearest 0.1 standard units.

[5] The pH and temperature of the effluent shall be determined when ammonia samples are collected.

[6] The water temperature of the effluent shall be taken as a field measurement. Measurement shall be made with a mercury-filled, or dial type thermometer, or a thermistor. Readings shall be reported to the nearest whole degree Celsius.

[7] Fecal coliform and *E. coli* levels shall be monitored in the discharge. If a minimum of five samples are collected in a calendar month, all of the samples collected are to be used in determining the geometric mean. Samples are to be collected at the same time as BOD_5, TSS, etc. If less than five samples are taken during any calendar month, the daily maximum shall be reported and the maximum limit still applies. ***This sampling protocol for fecal coliform and E. coli only applies if the discharge occurs between May 1 and September 30.***

Final Self-Monitoring Requirements

As a minimum, upon **May 1, 2014** and lasting through the life of this permit, the following parameters shall be monitored at the frequency and with the type of measurement indicated; samples or measurements shall be representative of the volume and nature of the monitored discharge.

Effluent Characteristic	Frequency	Reporting Values[1]	Sample Type[1]
Duration of Discharge, days	Monthly	Monthly Total[2]	Calculate
Total Flow, million gallons	Monthly	Monthly Total	Calculate
Flow Rate, MGD	At least three per discharge[3]	Daily Maximum; 30-Day Average	Instantaneous
pH, standard units	At least three per discharge[3]	Daily Minimum; Daily Maximum	Instantaneous[4, 5]
Water Temperature, °C	At least three per discharge[3]	Daily Maximum; 30-Day Average	Instantaneous[5, 6]
Five-Day Biochemical Oxygen Demand (BOD_5), mg/L	At least three per discharge[3]	Max 7-Day Average; 30-Day Average	Grab

[1] See Definitions.

[2] The date and time of the start and termination of each discharge shall also be reported in the comment section of the DMR.

[3] A minimum of three samples shall be taken during any discharge. A sample shall be taken at the beginning, middle, and end of the discharge if the discharge is less than one week in duration. If a single, continuous discharge is greater than one week in duration, three samples shall be taken the first week and one each following week. All of the samples collected during the 7-day or 30-day period are to be used in determining the averages. The permittee always has the option of collecting additional samples if appropriate.

[4] The pH shall be taken within 15 minutes of sample collection with a pH meter. The pH meter must be capable of simultaneous calibration to two points on the pH scale that bracket the expected pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment. Readings shall be reported to the nearest 0.1 standard units.

[5] The pH and temperature of the effluent shall be determined when ammonia samples are collected.

[6] The water temperature of the effluent shall be taken as a field measurement. Measurement shall be made with a mercury-filled, or dial type thermometer, or a thermistor. Readings shall be reported to the nearest whole degree Celsius.

Effluent Characteristic	Frequency	Reporting Values[1]	Sample Type[1]
Total Suspended Solids (TSS), mg/L	At least three per discharge[3]	Max 7-Day Average; 30-Day Average	Grab
Ammonia-Nitrogen (as N), mg/L	At least three per discharge[3]	Daily Maximum; 30-Day Average	Grab[5]
E. coli, no./100 mL	At least three per discharge[3, 7]	Daily Maximum; 30-Day Geo Mean	Grab

[7] *E. coli* levels shall be monitored in the discharge. If a minimum of five samples are collected in a calendar month, all of the samples collected are to be used in determining the geometric mean. Samples are to be collected at the same time as BOD_5, TSS, etc. If less than five samples are taken during any calendar month, the daily maximum shall be reported and the maximum limit still applies. ***This sampling protocol for E. coli only applies if the discharge occurs between May 1 and September 30.***

Reporting Requirements

Effluent monitoring results shall be summarized for each month and recorded on separate DMRs to be submitted to SDDENR on a **quarterly** basis. If no discharge occurs during a month, it shall be stated as such on the DMR.

Inspection Requirements

Monitoring shall consist of **monthly** inspections of the facility and the outfall to verify that proper operation and maintenance procedures are being practiced and whether or not there is a discharge occurring from this facility. **Daily** inspections are required during a discharge. The lift station shall be inspected on at least a **weekly** basis, although **daily** inspections are recommended. Documentation of each of these visits shall be kept in a notebook to be reviewed by SDDENR or EPA personnel when an inspection occurs.

SLUDGE

Based on the city of Parker's permit application, SDDENR does not anticipate sludge will be removed or disposed of during the life of the permit. Therefore, the proposed Surface Water Discharge permit shall not contain sludge disposal requirements. However, if sludge disposal is necessary, the city of Parker is required to submit to SDDENR a sludge disposal plan for review and approval **prior** to the removal and disposal of sludge.

DRAINAGE ISSUES

Turner County has the authority to regulate drainage. The city of Parker is responsible for getting any necessary drainage permits from the county **prior** to discharging.

ENDANGERED SPECIES

This is a renewal of an existing permit. No listed endangered species are expected to be impacted by activities related to this permit. However, the table below shows the species that may be present in the city of Parker's geographic area.

COUNTY	GROUP	SPECIES	CERTAINTY OF OCCURRENCE
TURNER	BIRD	CRANE, WHOOPING	POSSIBLE
	FISH	SHINER, TOPEKA	KNOWN

This information was accessible at the following US Fish and Wildlife Service website as of January 6, 2012: http://www.fws.gov/southdakotafieldoffice/SpeciesByCounty.pdf.

PERMIT EXPIRATION

A five-year permit is recommended.

PERMIT CONTACT

Any questions pertaining to this statement of basis can be directed to Tina Piroutek, Engineer II for the Surface Water Quality Program, at (605) 773-3351.

January 6, 2012

ATTACHMENT 1

Antidegradation Review

Permit Type: **Minor Municipal - Renewal** Applicant: **City of Parker**
Date Received: **6/23/2008** Permit #: **SD0020940**
County: **Turner** Legal Description: **NE ¼ of Sec 8, T99N, R53W**
Receiving Stream: **West Fork Vermillion River** Classification: **6, 8, 9, 10**
If the discharge affects a downstream waterbody with a higher use classification, list its name and uses: **Vermillion River (5, 8, 9, 10)**

APPLICABILITY

1. Is the permit or the stream segment exempt from the antidegradation review process under ARSD 74:51:01? Yes ☒ No ☐ If no, go to question #2. If yes, check those reasons why the review is not required:

☐ Existing facility covered under a surface water discharge permit is operating at or below design flows and pollutant loadings;
☐ *Existing effluent quality from a surface water discharge permitted facility is in compliance with all discharge permit limits;

☐ *Existing surface water discharge permittee was discharging to the current stream segment prior to March 27, 1973, and the quality and quantity of the discharge has not degraded the water quality of that segment as it existed on March 27, 1973;
☐ *The existing surface water discharge permittee, with DENR approval, has upgraded or built new wastewater treatment facilities between March 27, 1973, and July 1, 1988;
☐ The existing surface water discharge permittee discharges to a receiving water assigned only the beneficial uses of (9) and (10); the discharge is not expected to contain toxic pollutants in concentrations that may cause an impact to the receiving stream; and DENR has documented that the stream cannot attain a higher use classification. This exemption does not apply to discharges that may cause impacts to downstream segments that are of higher quality;
☐ Receiving water meets Tier 1 waters criteria. Any permitted discharge must meet water quality standards;
☐ The permitted discharge will be authorized by a Section 404 Corps of Engineers Permit, will undergo a similar review process in the issuance of that permit, and will be issued a 401 certification by the department, indicating compliance with the state's antidegradation provisions; or
☒ Other: This permit does not authorize an increase in effluent limits.

*An antidegradation review is not required where the proposal is to maintain or improve the existing effluent levels and conditions. Proposals for increased effluent levels, in these categories of activities are subject to review.

No further review required.

ANTIDEGRADATION REVIEW SUMMARY

2. The outcome of the review is:
   - ☒ A formal antidegradation review was not required for reasons stated in this worksheet. Any permitted discharge must ensure water quality standards will not be violated.
   - ☐ The review has determined that degradation of water quality should not be allowed. Any permitted discharge would have to meet effluent limits or conditions that would not result in any degradation estimated through appropriate modeling techniques based on ambient water quality in the receiving stream, or pursue an alternative to discharging to the waterbody.
   - ☐ The review has determined that the discharge will cause an insignificant change in water quality in the receiving stream. The appropriate agency may proceed with permit issuance with the appropriate conditions to ensure water quality standards are met.
   - ☐ The review has determined, with public input, that the permitted discharge is allowed to discharge effluent at concentrations determined through a total maximum daily load (TMDL). The TMDL will determine the appropriate effluent limits based on the upstream ambient water quality and the water quality standard(s) of the receiving stream.
   - ☐ The review has determined that the discharge is allowed. However, the full assimilative capacity of the receiving stream cannot be used in developing the permit effluent limits or conditions. In this case, a TMDL must be completed based on the upstream ambient water quality and the assimilative capacity allowed by the antidegradation review.
   - ☐ Other: _____

3. Describe any other requirements to implement antidegradation or any special conditions That are required as a result of this antidegradation review: _____

Tina Piroutek	January 6, 2012
Reviewer	Date
Kelli D. Buscher, P.E.	January 6, 2012
Team Leader	Date

ATTACHMENT 2

Monitoring Data

	BOD_5		Fecal Coliform		Duration of discharge	Total Flow	Flow rate		Ammonia (as N)		pH		TSS		Temperature	
	30 Day Avg	Max 7-Day Avg	30-Day Geo Mean	Daily Max	Monthly Total	Monthly Total	30 Day Avg	Daily Max	30 Day Avg	Daily Max	Daily Max	Daily Min	30 Day Avg	Max 7-Day Avg	30 Day Avg	Daily Max
Limit	30 mg/L	45 mg/L	1000 #/100mL	2000 #/100mL	N/A days	N/A Mgal	N/A MGD	N/A MGD	Varies mg/L	Varies mg/L	9.0 s.u.	6.5 s.u.	90 mg/L	135 mg/L	N/A ºC	N/A ºC
06/30/2004	5.75	17	10	10	14	12.75	0.91	1.18	**1.21**	**4.46**	8.7	8.4	15.75	56	22.2	23.7
03/31/2005	14	14	NR	NR	7	5.87	0.84	1.15	3.1	4.4	8.82	8.72	20	20	3.7	5
08/31/2005	16	36	84	330	16	12	0.75	1.08	0.11	0.13	9	8.9	65	112	26	27.5
01/31/2006	13.25	22	NR	NR	9	6.6	576	680	**5.78**	**12**	8.15	7.71	16.25	20	2.6	3.1
12/31/2009	**34.7**	38	NR	NR	5	0.5	0.1	0.1	3.79	4.86	8.9	8.82	52.7	60	1.9	2
03/31/2011	11.4	26	NR	NR	16	0.32	0.2	0.2	4.37	**17.1**	9	8.3	11.2	19	4.56	6

NR is Not Required. No sample was required for this parameter during the monitoring period.
Violations are bolded, shaded, and larger font.

ATTACHMENT 3

Ammonia Limits Development
for the
Parker Treatment Facility

in the West Fork Vermillion River
near
Parker, South Dakota

Prepared by

South Dakota Department of Environment and Natural Resources

2012

INTRODUCTION

Under Section 303(c) of the federal Clean Water Act, states have been required to develop water quality standards to protect public health and enhance water quality. In accordance with the Clean Water Act, the state of South Dakota has assigned beneficial uses to all waters of the state and developed water quality criteria to protect those uses. South Dakota's surface water quality standards and assigned beneficial uses are found in the Administrative Rules of South Dakota (ARSD) Article 74:51.

To ensure the protection of the state's surface water quality standards, the Clean Water Act authorized a permitting program for point source discharges of pollutants. The U.S. Environmental Protection Agency delegated this permitting program to the South Dakota Department of Environment and Natural Resources on December 30, 1993.

The department issues Surface Water Discharge permits containing, at a minimum, technology-based effluent limits. However, these limits are not always adequate to protect South Dakota's water quality. In those cases, the Department of Environment and Natural Resources develops water quality-based effluent limits. In accordance with the procedures and requirements outlined below, water quality-based effluent limits for ammonia will be developed for the city of Parker's wastewater treatment facility (WWTF). These limits will ensure the surface water quality standards for the West Fork Vermillion River and the Vermillion River near Parker are maintained and protected.

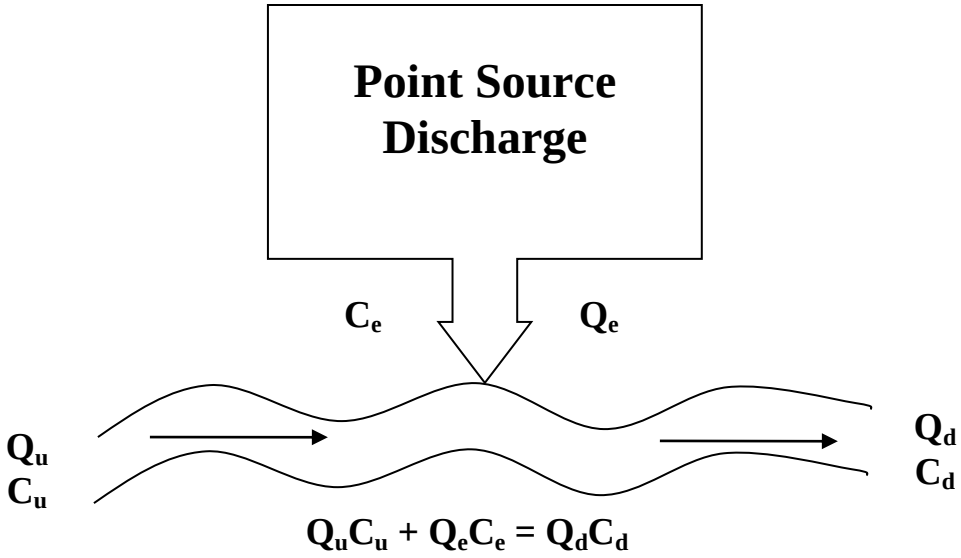
Developing the ammonia limits for the city of Parker is a matter of determining the maximum level of ammonia that can be present in the West Fork Vermillion River and the Vermillion River without causing the applicable South Dakota Surface Water Quality Standards (SDSWQS) for ammonia to be exceeded.

The effluent limits for ammonia are developed for critical conditions to be conservative, thereby assuring water quality standards are maintained under less critical conditions. Critical conditions are those at which the surface water quality standards are most likely to be violated. Critical conditions can be defined by several factors, including, but not limited to the following:

- stream flow (e.g., high, low);
- storm event occurrence and intensity;
- ambient water quality conditions (e.g., pH, temperature, etc.);
- diurnal variations in water column conditions;
- temporal occurrence of pollutant loadings from natural and human-induced activities;
- the presence or absence of salmonids; and
- the presence or absence of early life stages of aquatic life.

The following mass balance equation will be used to determine the ammonia limits for the city of Parker:

Figure 1



Where,

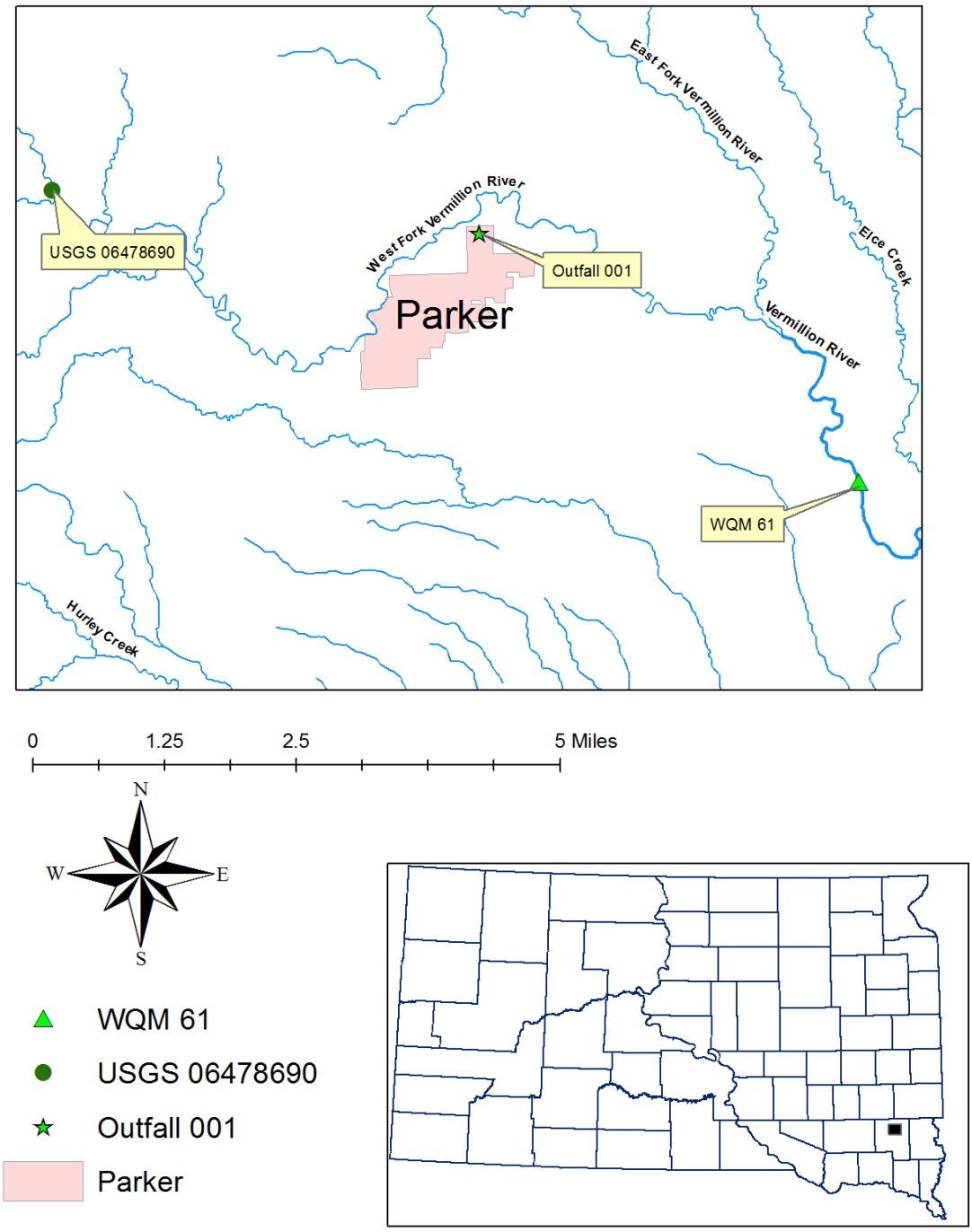
- $\mathbf{Q_u}$ = Receiving stream flow, in cubic feet per second (cfs);
- $\mathbf{C_u}$ = Ambient upstream ammonia concentration, in milligrams per liter (mg/L);
- $\mathbf{Q_e}$ = Effluent discharge flow rate, in cfs;
- $\mathbf{C_e}$ = Water quality based effluent limit for ammonia in mg/L;
- $\mathbf{Q_d}$ = Downstream flow (equal to $Q_u + Q_e$), in cfs; and
- $\mathbf{C_d}$ = Allowable instream ammonia concentration (based on the SD Surface Water Quality Standards), in mg/L.

Using the mass balance equation and the following information, the water quality-based effluent limits for ammonia can be determined for the city of Parker's discharge into the West Fork Vermillion River and the Vermillion River.

GEOGRAPHICAL EXTENT

The West Fork Vermillion River and the Vermillion River are located in the Vermillion River Basin in the southeastern portion of the state. The Vermillion River Basin covers approximately 2,673 square miles of land, which is comprised largely of cropland. Figure 2 shows the West Fork Vermillion River and the Vermillion River near Parker.

Figure 2: The Vermillion River Watershed



Past experience has shown that, due to the decay and transformation of organic pollutants such as ammonia, most adverse effects are generally exhibited within 10 miles of pollutant loading. While this rule of thumb can certainly vary depending on the source of the pollutant, fate and transport characteristics, hydrologic conditions, and other factors, it has generally held true in past instances. Therefore, the development of the ammonia limits for the city of Parker's

discharge into the West Fork Vermillion River and the Vermillion River will be relatively narrow in spatial extent.

ALLOWABLE INSTREAM AMMONIA CONCENTRATION (C_d)

South Dakota Surface Water Quality Standards

The SDSWQS specify the beneficial uses assigned to specific water bodies. The SDSWQS also contain specific narrative and numeric criteria that must be met to ensure the protection of each beneficial use. The West Fork Vermillion River is classified for the following beneficial uses:

(6) Warmwater marginal fish life propagation waters;
(8) Limited-contact recreation waters;
(9) Fish and wildlife propagation, recreation, and stock watering waters; and
(10) Irrigation waters.

The Vermillion River is classified for the following beneficial uses:

(5) Warmwater semipermanent fish life propagation waters;
(8) Limited-contact recreation waters;
(9) Fish and wildlife propagation, recreation, and stock watering waters; and
(10) Irrigation waters.

Due to the distance to the Vermillion River and the critical low flow of the West Fork Vermillion River, the limits will be developed based on the classification of the West Fork Vermillion River. These limits will be more stringent and ensure the protection of the beneficial uses of both the West Fork Vermillion River and the Vermillion River.

Waterbodies designated in the SDSWQS with the beneficial use classification of either coldwater permanent or coldwater marginal fish life propagation are suitable for supporting salmonids. Waterbodies with the beneficial use classifications of warmwater permanent, warmwater semipermanent, or warmwater marginal fish life propagation will likely not have salmonids. The presence or absence of early life stages can be assumed based on the beneficial uses assigned to the receiving stream.

Salmonids are not expected to be present in either the West Fork Vermillion River or the Vermillion River. Early life stages are expected to be present from May 1- October 31 in the West Fork Vermillion River based on the SDSWQS (ARSD Section 74:51:01:49).

Allowable Instream Ammonia Levels

Based on the beneficial uses of the West Fork Vermillion River and the Vermillion River, the following equations can be used determine the total allowable ammonia concentration in the receiving stream (SDSWQS, ARSD Chapter 74:51:01, Appendix A):

Equation 1: Daily Maximum (Salmonids present)

$$Cd = \frac{0.275}{(1+10^{(7.204-pH)})} + \frac{39.0}{(1+10^{(pH-7.204)})}$$

Equation 2: Daily Maximum (Salmonids NOT present)

$$Cd = \frac{0.411}{(1+10^{(7.204-pH)})} + \frac{58.4}{(1+10^{(pH-7.204)})}$$

Equation 3: 30-day Average (Early Life Stages Present)

$$Cd = \left[\frac{0.0577}{(1+10^{(7.688-pH)})} + \frac{2.487}{(1+10^{(pH-7.688)})}\right] \times MIN\left(2.85, 1.45\times 10^{0.028(25-T)}\right)$$

Equation 4: 30-day Average (Early Life Stages Absent)

$$Cd = \left[\frac{0.0577}{(1+10^{(7.688-pH)})} + \frac{2.487}{(1+10^{(pH-7.688)})}\right] \times [1.45\times 10^{0.028((25-MAX(T,7))}]$$

pH = the pH of the water quality sample in standard units
T = the water temperature of the sample in degrees Centigrade
MIN = use either 2.85 or the value of $1.45^{0.028*(25-T)}$, whichever is the smaller value
MAX = use either the water temperature (T) for the sample, or 7, whichever is the greater value

To develop the ammonia limits for the city of Parker, equations 2, 3, and 4 will be used to determine the instream ammonia concentration, C_d, allowed in the West Fork Vermillion River. C_d will be expressed as both 30-day average and daily maximum concentrations. The limits have been developed on a monthly basis due to the availability of monthly data.

Instream Water Quality Monitoring

The department maintains a statewide network of fixed monitoring stations to gain a historic record of water quality for various streams around the state. This water quality monitoring (WQM) network consists of 151 monitoring stations, which are sampled at monthly, quarterly, or seasonal intervals. The goal of this sampling is to collect reliable water quality data that reflects actual stream conditions; to collect data to determine the effectiveness of controls on point and nonpoint sources of pollution; and to collect data to evaluate the appropriateness of current beneficial use designations.

Water quality samples are collected at a WQM station on the Vermillion River. A description of the station is listed below. Figure 2 denotes the location of WQM 61.

WQM 61	Vermillion River east-west SD Hwy 44 bridge 3 miles west of Chancellor. (Latitude 43.37277º, Longitude -97.054444º)

Ambient temperature, pH, and ammonia data at WQM 61 were obtained to represent instream conditions. The water quality information obtained from WQM is presented in Attachment 4. The pH and temperature data are summarized in Table 1 below.

Calculation of Allowable Instream Ammonia Concentration (C_d)

The SDSWQS specify the total ammonia concentration that is allowed at a given pH and temperature. The 50th percentile of the pH and temperature at WQM 61 was determined to ensure the ammonia standards are maintained during critical conditions. The 50th percentile was used instead of the 80th percentile due to the monitoring station's distance from the discharge point. This information was used to calculate the allowable instream ammonia concentrations for each month. Table 1 summarizes the allowable instream ammonia (C_d) for the West Fork Vermillion River.

Table 1: Allowable Instream Total Ammonia Concentrations for the West Fork Vermillion River.

Month	Temperature (°C)	pH (s.u.)	C_d, Allowable Total Ammonia (mg/L)	
			30-Day Average	Daily Maximum
January 1 – January 31	1.00	7.80	**5.17**	**12.14**
February 1 – February 29	1.00	7.60	**6.46**	**17.03**
March 1 – March 31	5.25	8.05	**3.67**	**7.65**
April 1 – April 30	13.15	8.25	**1.81**	**5.20**
May 1 – May 31	18.95	8.20	**1.35**	**5.73**
June 1 – June 30	22.65	8.23	**1.01**	**5.40**
July 1 – July 31	26.00	8.19	**0.87**	**5.84**
August 1 – August 31	25.60	8.20	**0.88**	**5.73**
September 1 – September 30	20.00	8.10	**1.47**	**6.95**
October 1 – October 31	11.00	8.26	**1.63**	**5.10**
November 1 – November 30	4.00	8.00	**3.95**	**8.41**
December 1 – December 31	1.00	7.80	**5.17**	**12.14**

AMBIENT AMMONIA CONCENTRATION (C_u)

The ammonia data at WQM 61 was reviewed to determine the ambient water quality in the West Fork Vermillion River. The 50th percentile of the ammonia data was determined to ensure the ammonia standards are maintained during critical conditions. The ammonia data from WQM 61 is presented in Attachment 4. Table 2 below summarizes the 50th percentile ammonia data for each season. This data represents the ambient ammonia concentration for the West Fork Vermillion River (C_u).

Table 2: Ambient Ammonia Data for the West Fork Vermillion River

Month	Ammonia (mg/L)
January 1 – January 31	0.09
February 1 – February 29	0.15
March 1 – March 31	0.05
April 1 – April 30	0.04
May 1 – May 31	0.02
June 1 – June 30	0.02
July 1 – July 31	0.02
August 1 – August 31	0.02
September 1 – September 30	0.02
October 1 – October 31	0.02
November 1 – November 30	0.02
December 1 – December 31	0.02

EFFLUENT DISCHARGE FLOW RATE (Q_e)

The effluent discharge flow rate, Q_e, can be determined in several different ways. If effluent data is available for the discharger, the 50^{th} or 80^{th} percentile of the daily flow can be used. The effluent design flow rate of the wastewater treatment facility may be used as the expected effluent flow rate in the absence of actual discharge data. Alternatively, for stabilization pond systems, it may be appropriate to develop an effluent flow rate based on expected performance.

For the purposes of developing ammonia limits for the city of Parker, 1.79 cfs was used for Q_e based on the 80^{th} percentile of the daily maximum flow to ensure the ammonia standards are maintained during critical conditions. See Attachment 5 for more details.

Table 3 below summarizes the effluent flow rate used in these calculations.

RECEIVING STREAM FLOW (Q_u)

The United States Geological Survey (USGS) maintains hundreds of flow monitoring sites in South Dakota. The receiving stream flow rate, Q_u, is determined from an analysis of stream flow data available, incorporating the flow considerations required by *South Dakota's Mixing Zone and Dilution Implementation Procedures*.

Critical conditions for ammonia presumably occur when stream flows are relatively low. Therefore, the ammonia limits will be developed for low stream flow conditions. Should it be determined that water quality standards are violated at other flow conditions, the permit would be reopened and new limits would be developed.

ARSD Section 74:51:01:30 specifies that surface water quality standards apply to low quality fishery waters when flows meet or exceed the minimum 7-day average low flow that can be expected to occur once every 5 years (7Q5), or 1.0 cfs, whichever is greater. The 7Q5 is

therefore the minimum, or critical, flow for which the SDSWQS must be maintained, although all Surface Water Discharge permit limits remain in force below this minimum flow.

The monthly 7Q5 flows were determined using data retrieved from the USGS gauging station USGS 06478690 and a log Pearson type III analysis developed in Microsoft Visual FoxPro 9.0. A description of the station is listed below. Figure 2 denotes the location of the USGS gauging station.

USGS 06478690 West Fork Vermillion River on right bank 10 feet downstream from bridge, 3.7 miles northwest of Parker, and 13.9 miles upstream from confluence with the East Fork Vermillion River (Latitude 43.415639º, Longitude -97.204861º)

South Dakota's water quality standards allow a zone of mixing for discharges. In accordance with the SDSWQS, chronic water quality criteria must be met at the end of the mixing zone; the acute criteria must be met at all times within the mixing zone. The mixing zone is therefore a limited portion of a water body where mixing of the effluent and receiving stream is in progress, but not complete. In some cases, the discharge will not completely mix with the entire receiving stream. There are many factors that influence the rate of mixing in a stream. A few of these factors are the flow and velocity of the receiving stream, the flow and velocity of the effluent, the slope of the stream, and other stream characteristics.

The *South Dakota Mixing Zone and Dilution Implementation Procedures* outlines an approach for modeling the mixing zone. Using these procedures, the 7Q5 is adjusted to account for the allowable ratio of flow available in the receiving stream. This adjusted flow represents the receiving stream flow rate (Q_u).

Table 3 and Attachment 6 summarize the flow data and the determination of Q_u for the West Fork Vermillion River.

Table 3: Critical Low Flow Values for the West Fork Vermillion River

Month	7Q5 Low Flow (cfs)	Effluent Flow (cfs)	Ratio of Effluent to 7Q5	Allowable Ratio of 7Q5	Critical Low Flow Q_u (cfs)
January 1 – January 31	1.00	1.79	1.79	1.00	**1.00**
February 1 – February 29	1.00	1.79	1.79	1.00	**1.00**
March 1 – March 31	1.00	1.79	1.79	1.00	**1.00**
April 1 – April 30	1.00	1.79	1.79	1.00	**1.00**
May 1 – May 31	1.00	1.79	1.79	1.00	**1.00**
June 1 – June 30	1.00	1.79	1.79	1.00	**1.00**
July 1 – July 31	1.00	1.79	1.79	1.00	**1.00**
August 1 – August 31	1.00	1.79	1.79	1.00	**1.00**
September 1 – September 30	1.00	1.79	1.79	1.00	**1.00**

Month	7Q5 Low Flow (cfs)	Effluent Flow (cfs)	Ratio of Effluent to 7Q5	Allowable Ratio of 7Q5	Critical Low Flow Q_u (cfs)
October 1 – October 31	1.00	1.79	1.79	1.00	**1.00**
November 1 – November 30	1.00	1.79	1.79	1.00	**1.00**
December 1 – December 31	1.00	1.79	1.79	1.00	**1.00**

DOWNSTREAM FLOW RATE (Q_d)

The downstream flow rate, Q_d, is simply the sum of the upstream flow rate (Q_u) and the effluent flow rate (Q_e). The downstream flow rate used for the calculation of the ammonia limits for the city of Parker's discharge into the West Fork Vermillion River is summarized in Table 4 below.

CALCULATION OF AMMONIA LIMIT (C_e)

Each of the variables determined above is summarized in Table 4. Using the mass balance equation, the ammonia limits for the Parker's discharge into the West Fork Vermillion River can be calculated as follows:

$$Ce = \frac{(Qd*Cd) - (Qu*Cu)}{Qe}$$

The water quality-based effluent limits for ammonia for the city of Parker's discharge into the West Fork Vermillion River are presented in Table 4.

Table 4: Variables Calculated for Mass Balance Equation

Month	C_u, mg/L	C_d, mg/L		Q_d, cfs	Q_e, cfs	C_e, mg/L	
		30-day Average	Daily Maximum			30-Day Average	Daily Maximum
January 1 – January 31	0.09	5.17	12.14	2.79	1.79	8.0	18.9
February 1 – February 29	0.15	6.46	17.03	2.79	1.79	10.0	26.5
March 1 – March 31	0.05	3.67	7.65	2.79	1.79	5.7	11.9
April 1 – April 30	0.04	1.81	5.20	2.79	1.79	2.8	8.1
May 1 – May 31	0.02	1.35	5.73	2.79	1.79	2.1	8.9
June 1 – June 30	0.02	1.01	5.40	2.79	1.79	1.6	8.4

Month	C_u, mg/L	C_d, mg/L		Q_d, cfs	Q_e, cfs	C_e, mg/L	
		30-day Average	Daily Maximum			30-Day Average	Daily Maximum
July 1 – July 31	0.02	0.87	5.84	2.79	1.79	1.3	9.1
August 1 – August 31	0.02	0.88	5.73	2.79	1.79	1.4	8.9
September 1 – September 30	0.02	1.47	6.95	2.79	1.79	2.3	10.8
October 1 – October 31	0.02	1.63	5.10	2.79	1.79	2.5	7.9
November 1 – November 30	0.02	3.95	8.41	2.79	1.79	6.1	13.1
December 1 – December 31	0.02	5.17	12.14	2.79	1.79	8.0	18.9

The city of Parker's current permit contains ammonia limits. The current effluent limits were compared to the limits calculated using the information presented above. A comparison of the two limits is presented in Table 5 below.

All of the city's current limits are adequate to protect the beneficial use and the water quality criteria for the West Vermillion River except for the 30-Day Average for April. These limits will be continued in the proposed permit, to prevent backsliding. For the 30-Day Average for April, it was necessary to establish more stringent limits. The shaded values in Table 5 indicate the limits that will be proposed for the city of Parker.

Table 5: Comparison of Current and Proposed Effluent Limits

Month	Current Effluent Limits		Calculated Effluent Limits	
	30-Day Average (mg/L)	Daily Maximum (mg/L)	30-Day Average (mg/L)	Daily Maximum (mg/L)
January 1 – January 31	**5.5**	**10.1**	8.0	18.9
February 1 – February 29	**5.5**	**10.1**	10.0	26.5
March 1 – March 31	**5.5**	**10.1**	5.7	11.9
April 1 – April 30	3.0	**6.0**	**2.8**	8.1
May 1 – May 31	**1.0**	**1.1**	2.1	8.9
June 1 – June 30	**1.0**	**1.1**	1.6	8.4
July 1 – July 31	**1.0**	**1.1**	1.3	9.1
August 1 – August 31	**1.0**	**1.1**	1.4	8.9
September 1 – September 30	**1.0**	**1.1**	2.3	10.8
October 1 – October 31	**2.5**	**4.4**	2.5	7.9
November 1 – November 30	**5.5**	**10.1**	6.1	13.1
December 1 – December 31	**5.5**	**10.1**	8.0	18.9

ATTACHMENT 4

Water Quality Data
(WQM 61 Raw and Reduced Data)

January

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
01/18/1977	15:15				0.0
01/25/1978	08:00			6.5	0.0
01/24/1979	13:00			7.4	0.0
01/09/1980	10:10			6.4	0.0
01/27/1981	09:00			7.4	0.0
01/27/1982	13:15			7.8	0.3
01/26/1999	08:00	Non-detect	0.02	7.97	0.2
01/25/2000	08:00	0.05	0.05	7.53	1.5
01/09/2001	08:00	0.32	0.32	7.76	3.2
01/07/2002	08:00	0.06	0.06	8.13	2
01/07/2003	12:40	Non-detect	0.02	8.3	2
01/06/2004	14:30	Non-detect	0.02	8	1
01/12/2005	14:40	0.13	0.13	7.5	1
01/10/2006	14:15	0.27	0.27	8.1	1
01/09/2007	15:35	0.53	0.53	7.9	1
01/08/2008	14:30	<0.02	0.02	7.8	0
01/22/2009	14:30	0.09	0.09	7.3	1
01/13/2010	17:00	0.16	0.16	7.8	1
01/19/2011	15:00	0.1	0.10	8.5	1
		Average	**0.14**	**7.67**	**0.85**
		50th Percentile	**0.09**	**7.80**	**1.00**
		80th Percentile	**0.23**	**8.06**	**1.20**

February

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
02/18/1976	13:10			7.5	0.0
02/21/1978	08:00:00			6.3	-0.6
02/26/1980	15:33				0.0
02/24/1981	14:30			7.6	1.1
02/24/1982	08:30			7.3	0.0
02/22/1999	08:00	Non-detect	0.02	8.35	0.1
02/24/2000	08:00	0.15	0.15	8.03	3.5
02/11/2002	08:00:00	Non-detect	0.02	8.23	2
02/12/2003	14:30	Non-detect	0.02	7.9	1
02/10/2004	14:15	0.15	0.15	7.4	1
02/15/2005	12:10	0.25	0.25	8	1
02/14/2006	13:45	Non-detect	0.02	8.2	1
02/21/2007	15:10	0.47	0.47	7.4	1
02/19/2008	15:00	0.09	0.09		
02/11/2009	13:45	0.61	0.61	8.1	1
02/17/2010	15:15	0.18	0.18	7.5	1
02/08/2011	14:20	0.18	0.18	7.5	1
		Average	**0.18**	**7.69**	**0.88**
		50th Percentile	**0.15**	**7.60**	**1.00**
		80th Percentile	**0.24**	**8.12**	**1.00**

March

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
03/02/1976	09:30			7.5	0.0
03/09/1977	14:30			6.5	0.0
03/29/1978	08:00:00			7.1	5.6
03/27/1979	09:15			7.3	2.2
03/24/1980	14:45				3.9
03/24/1981	15:00			8.1	11.1
03/23/1982	15:30				3.3
03/23/1999	08:00	Non-detect	0.02	8.48	5.5
03/28/2000	08:00	Non-detect	0.02	8.47	10.7
03/27/2001	08:00	1.25	1.25	7.69	9.5
03/26/2002	08:00:00	Non-detect	0.02	8.18	2.5
03/18/2003	13:00	0.05	0.05	8.3	8
03/29/2004	10:50	Non-detect	0.02	8.1	9
03/22/2005	13:15	Non-detect	0.02	8.3	4
03/29/2006	13:40	Non-detect	0.02	8.4	10
03/20/2007	15:00	1.29	1.29	7.8	4
03/25/2008	14:10	0.89	0.89	8	6
03/18/2009	10:15	0.05	0.05	8.1	5
03/25/2010	14:20	0.16	0.16	7.8	6
03/15/2011	14:50	1	1.00	7.6	1
		Average	**0.37**	**7.87**	**5.37**
		50th Percentile	**0.05**	**8.05**	**5.25**
		80th Percentile	**0.96**	**8.30**	**9.10**

April

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
04/07/1976	13:30			8	12.2
04/19/1977	14:30			8.5	17.8
04/24/1978	08:00:00			7.6	7.8
04/23/1979	10:30			8.2	15.6
04/29/1980	14:18			8.1	17.8
04/28/1981	15:45			8.2	14.4
04/27/1982	15:50			8.7	15.6
04/28/1982	08:40			8.7	15.6
04/19/1999	08:00	0.03	0.03	8.08	10.4
04/18/2000	08:00	Non-detect	0.02	8.29	13.3
04/23/2001	08:00	0.27	0.27	7.96	6
04/08/2002	08:00:00	0.17	0.17	8.35	10
04/15/2003	18:40	Non-detect	0.02	8.4	21
04/13/2004	14:50	Non-detect	0.02	8.3	14
04/12/2005	13:15	Non-detect	0.02	8.2	9
04/11/2006	13:15	0.14	0.14	8	13
04/12/2007	14:15	0.12	0.12	7.8	6
04/15/2008	15:00	<0.02	0.02	8.7	11
04/14/2009	14:20	<0.05	0.05	8.4	13
04/13/2010	14:15	<0.05	0.05	8.4	17
		Average	**0.08**	**8.24**	**13.02**
		50th Percentile	**0.04**	**8.25**	**13.15**
		80th Percentile	**0.14**	**8.42**	**15.88**

May

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
05/04/1976	14:30			8	18.9
05/24/1977	15:30			8.5	26.7
05/22/1978	08:00:00			8.2	22.2
05/29/1979	09:40			7.9	22.2
05/28/1980	14:15			8.2	23.9
05/27/1981	15:45			7.6	22.2
05/25/1982	15:30			7.5	17.8
05/17/1999	08:00	Non-detect	0.02	8.18	17.2
05/30/2000	08:00	Non-detect	0.02	8.42	23.2
05/21/2001	08:00	Non-detect	0.02	8.28	11.5
05/07/2002	08:00:00	Non-detect	0.02	8.44	15
05/12/2003	15:30	Non-detect	0.02		18
05/19/2004	14:50	Non-detect	0.02	8.2	17
05/17/2005	12:35	Non-detect	0.02	8.5	17
05/09/2006	14:05	Non-detect	0.02	8.4	19
05/15/2007	14:15	0.02	0.02	7.9	17
05/20/2008	13:45	<0.02	0.02	8.4	18
05/05/2009	14:45	<0.05	0.05	8.3	20
05/19/2010	15:30	<0.05	0.05	8.4	20
05/10/2011	14:05	<0.05	0.05	8.2	19
		Average	**0.03**	**8.19**	**19.29**
		50th Percentile	**0.02**	**8.20**	**18.95**
		80th Percentile	**0.04**	**8.41**	**22.20**

June

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
06/08/1976	12:30			8	23.3
06/21/1977	15:00			8.5	21.1
06/27/1978	08:00:00			7.3	25.0
06/25/1979	09:15			8.2	24.4
06/24/1980	14:00			8.3	25.0
06/23/1981	15:40			8.2	26.1
06/29/1982	15:15			7.5	20.0
06/14/1999	08:00	Non-detect	0.02	8.35	24.7
06/27/2000	08:00	Non-detect	0.02	8.12	20.2
06/12/2001	08:00	0.25	0.25	8.26	22
06/18/2002	08:00:00	Non-detect	0.02	8.39	25.5
06/10/2003	14:00	Non-detect	0.02	8.4	20
06/14/2004	14:50	Non-detect	0.02	8.4	25
06/14/2005	12:20	0.11	0.11	7.9	20
06/13/2006	13:55	<0.02	0.02	8.4	27
06/05/2007	14:40	<0.02	0.02	8.4	22
06/17/2008	14:10	0.02	0.02	8.3	22
06/23/2009	14:30	0.08	0.08	8	26
06/15/2010	15:30	0.09	0.09	7.6	21
06/14/2011	14:30	<0.05	0.05	8.1	19
		Average	**0.06**	**8.13**	**22.96**
		50th Percentile	**0.02**	**8.23**	**22.65**
		80th Percentile	**0.09**	**8.40**	**25.10**

July

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
07/09/1975	14:00			8.5	
07/07/1976	12:30			8	23.3
07/19/1977	14:30			9	26.7
07/24/1978	08:00:00			7.8	25.0
07/26/1979	10:10			7.9	26.7
07/31/1980	14:15			8.2	24.4
07/28/1981	15:45			7.4	20.6
07/27/1982	15:35				26.1
07/26/1999	08:00	Non-detect	0.02	7.47	31.4
07/27/2000	08:00	Non-detect	0.02	8.18	24.2
07/17/2001	08:00	0.03	0.03	7.98	24
07/10/2002	08:00:00	Non-detect	0.02	8.61	28.5
07/08/2003	15:25	0.06	0.06	7.8	23
07/13/2004	14:30	Non-detect	0.02	8.3	28
07/20/2005	17:10	Non-detect	0.02	7.9	31
07/18/2006	15:30	<0.02	0.02	8.4	30
07/10/2007	14:50	<0.02	0.02	8.4	26
07/16/2008	14:30	<0.02	0.02	8.5	29
07/21/2009	14:30	<0.05	0.05	8.3	24
07/13/2010	15:20	<0.05	0.05	8.3	26
07/12/2011	14:35	<0.05	0.05	8.1	24
		Average	**0.03**	**8.15**	**26.09**
		50th Percentile	**0.02**	**8.19**	**26.00**
		80th Percentile	**0.05**	**8.42**	**28.60**

August

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
08/06/1975	13:40			8	25.5
08/03/1976	13:30			9	24.4
08/16/1977	08:00			8	17.8
08/22/1978	08:00:00			7.4	30.0
08/28/1979	14:41			8.3	26.7
08/26/1980	15:09			8	20.0
08/25/1981	15:45				23.3
08/24/1982	15:30			7.8	25.6
08/23/1999	08:00	Non-detect	0.02	7.59	24.5
08/09/2000	08:00	Non-detect	0.02	8.36	31.2
08/13/2001	08:00	Non-detect	0.02	8.65	25
08/05/2002	08:00:00	0.03	0.03	8.22	24
08/19/2003	13:55	Non-detect	0.02	8	26
08/10/2004	13:50	Non-detect	0.02	8	22
08/30/2005	13:10	Non-detect	0.02	8.6	25
08/15/2006	17:45	<0.02	0.02	8.4	28
08/21/2007	15:25	<0.02	0.02	8.2	28
08/12/2008	14:25	<0.02	0.02	8.4	26
08/11/2009	13:05	<0.05	0.05	8.3	26
08/10/2010	15:40	<0.05	0.05	7.9	27
08/02/2011	15:05	<0.05	0.05	8.2	30
		Average	**0.03**	**8.16**	**25.30**
		50th Percentile	**0.02**	**8.20**	**25.55**
		80th Percentile	**0.03**	**8.40**	**27.20**

September

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
09/20/1976	13:50			8.5	17.8
09/20/1977	08:30			7.5	15.6
09/25/1978	08:00:00			7.8	19.4
09/24/1979	13:47			8.1	21.1
09/25/1979	13:47			8.1	21.1
09/30/1980	14:17			8.5	20.0
09/30/1981	15:35			7.8	15.6
09/23/1999	08:00	Non-detect	0.02	6.91	19.2
09/12/2000	08:00	0.04	0.04	8.18	17.3
09/10/2001	08:00	Non-detect	0.02	8.68	23
09/04/2002	08:00:00	Non-detect	0.02	8.43	22
09/16/2003	11:10	Non-detect	0.02	7.9	19
09/07/2004	14:50	Non-detect	0.02	7.4	22
09/20/2005	13:10	Non-detect	0.02	8.5	20
09/26/2006	15:05	<0.02	0.02	8.5	18
09/18/2007	14:20	<0.02	0.02	7.9	21
09/23/2008	15:00	<0.02	0.02	8.4	22
09/14/2009	14:40	<0.05	0.05	8.1	23
09/08/2010	13:45	<0.05	0.05	7.9	18
09/13/2011	14:45	<0.05	0.05	8.5	22
		Average	**0.03**	**8.08**	**19.86**
		50th Percentile	**0.02**	**8.10**	**20.00**
		80th Percentile	**0.05**	**8.50**	**22.00**

October

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
10/09/1975	11:30			8	11.1
10/18/1976	16:30			8.5	3.3
10/26/1977	09:30			8	9.4
10/24/1978	08:00:00			8	8.3
10/29/1979	16:20			8.3	13.3
10/28/1980	08:05				2.2
10/27/1981	15:20				12.2
10/26/1999	08:00	Non-detect	0.02	7.08	9.6
10/26/2000	08:00	Non-detect	0.02	8.2	13.3
10/16/2001	08:00	Non-detect	0.02	8.76	11
10/15/2002	08:00:00	Non-detect	0.02	8.22	10
10/06/2003	16:50	Non-detect	0.02	8	20
10/12/2004	15:05	Non-detect	0.02	8.4	15
10/12/2005	13:15			8.5	14
10/11/2006	14:10	<0.02	0.02	8.4	8
10/10/2007	14:10	<0.02	0.02	8.4	14
10/15/2008	15:45	0.04	0.04	8.4	11
10/20/2009	14:25	<0.05	0.05	8	11
10/13/2010	14:10	<0.05	0.05	8.2	15
10/18/2011	15:05	<0.05	0.05	8.3	10
		Average	**0.03**	**8.20**	**11.09**
		50th Percentile	**0.02**	**8.26**	**11.00**
		80th Percentile	**0.05**	**8.40**	**14.00**

November

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
11/04/1975	10:30			7.5	10.0
11/15/1976	15:00			8	2.2
11/29/1977	14:30			7.4	1.7
11/21/1978	08:00:00			7	1.7
11/27/1979	09:42			7.8	0.0
11/25/1980	08:45				1.1
11/30/1981	15:20				2.2
11/16/1999	08:00	Non-detect	0.02	6.86	7.5
11/27/2000	08:00	0.07	0.07	6.89	2.1
11/19/2001	08:00	Non-detect	0.02	8.62	6.5
11/06/2002	08:00:00	Non-detect	0.02	8.46	3.5
11/19/2003	13:10	Non-detect	0.02	8.4	10
11/08/2004	16:10	Non-detect	0.02	8.6	10
11/22/2005	14:10	Non-detect	0.02	8.4	7
11/07/2007	13:50	<0.02	0.02	8.6	4
11/18/2008	14:00	<0.02	0.02	8.5	2
11/17/2009	15:10	<0.05	0.05	7.9	5
11/10/2010	12:30	<0.05	0.05	8	9
11/08/2011	14:10	<0.05	0.05	8.4	7
		Average	**0.03**	**7.96**	**4.87**
		50th Percentile	**0.02**	**8.00**	**4.00**
		80th Percentile	**0.05**	**8.49**	**8.10**

December

Sample Date	Sample Time	Ammonia (as N) mg/L	Ammonia used in calculations	pH, s.u.	Temperature (ºC)
12/08/1975	10:00			7.5	0.0
12/20/1976	08:00:00				0.0
12/28/1977	12:45				0.0
12/19/1978	08:00:00			7.5	1.1
12/03/1979	16:21			8.7	0.0
12/29/1980	08:30			7.6	0.0
12/29/1981	15:30			7.5	0.0
12/13/1999	08:00	Non-detect	0.02		1.6
12/04/2000	08:00	0.09	0.09	6.98	1.2
12/18/2001	08:00	0.08	0.08	8.34	2
12/10/2002	08:00:00	Non-detect	0.02	8.2	1.5
12/02/2003	13:15	Non-detect	0.02	8.2	1
12/08/2004	14:50	Non-detect	0.02	8.4	3
12/13/2005	10:40	0.15	0.15	7.9	1
12/14/2006	14:10	<0.02	0.02	7.9	1
12/04/2007	14:35	<0.02	0.02	8.2	0
12/18/2008	14:50	<0.02	0.02		1
12/16/2009	14:30	<0.05	0.05	7.1	1
12/07/2010	14:50	<0.05	0.05	7.4	1
12/13/2011	14:10	<0.05	0.05	7.7	1
		Average	**0.05**	**7.82**	**0.87**
		50th Percentile	**0.02**	**7.80**	**1.00**
		80th Percentile	**0.07**	**8.20**	**1.26**

Note: The detection limit for ammonia of 0.02 was used to determine the average and percentile calculations for data labeled Non-Detect. For data with a less than value, the value stated was used. For example if the level was <0.05 mg/L, 0.05 mg/L was used in the calculations.

ATTACHMENT 5

Point Source Dischargers Flow Rate

Raw and Reduced Effluent Flow Data

	Flow Rate	
	30-Day Avg	Daily Max
	MGD	MGD
06/30/2004	0.91	1.18
03/31/2005	0.84	1.15
08/31/2005	0.75	1.08
12/31/2009	0.1	0.1
03/31/2011	0.2	0.2
Average	0.56	0.742
50th Percentile	0.75	1.08
80th Percentile	0.854	1.156
80th Percentile (cfs)	1.322	**1.789**

ATTACHMENT 6

Receiving Stream Flow Data

RECEIVING STREAMFLOW DATA
USGS 06478690 Gauging Station
September 1, 1961 – December 5, 2011

season	7Q5	stdev	skew	zfactor	kfactor
Jan	0.0003	5.606471	0.19194	-0.839527	-0.847445
Feb	0.0001	5.986798	0.179682	-0.839527	-0.847031
Mar	0.0011	6.053661	0.178829	-0.839527	-0.847002
Apr	0.2232	3.665897	0.294619	-0.839527	-0.850419
May	0.0385	4.166967	0.260162	-0.839527	-0.84952
Jun	0.0332	4.139744	0.261893	-0.839527	-0.849567
Jul	0.0153	4.066366	0.266456	-0.839527	-0.849692
Aug	0.0008	5.1981	0.207429	-0.839527	-0.84795
Sep	0.0004	5.186371	0.204697	-0.839527	-0.847863
Oct	0.0005	5.287851	0.200768	-0.839527	-0.847736
Nov	0.0016	5.051044	0.210181	-0.839527	-0.848038
Dec	0.0006	5.370887	0.197664	-0.839527	-0.847634

Note: Because all 7Q5 values were less than 1 cfs, 1 cfs was used in all calculations for the 7Q5 flow.