STATEMENT OF BASIS

PERMITTEE: Standing Rock Rural Water System

FACILITY: Standing Rock Rural Water System Water Treatment Plant

PERMIT NO.: SD-0030996

RESPONSIBLE OFFICIAL: Ralph Walker, Director
Standing Rock Rural Water System
P. O Box 429
Fort Yates, ND 58538
(701) 854-7415
Email - omr2@westriv.com

FACILITY CONTACT: Contact During Construction
Joseph Honner, P.E., Project Engineer
Bartlett & West
605-274-7415
Email – joe.honner@bartwest.com
Contact After Operational Status Achieved
Ralph Walker, Director, SRRWS
See Responsible Official

PERMIT TYPE: New Permit, Minor Permit, Indian Country

Background Information

This statement of basis is for a new permit for the Standing Rock Rural Water System's water treatment plant (WTP) that is being constructed on the Standing Rock Indian Reservation in Corson County, South Dakota. The WTP is located in the SE ¼ Sec 1, T20N, R29E at approximately latitude 45° 43' 15" N, longitude 100° 29' 15" W.

Water will be pumped to the WTP from Oahe Reservoir on the Missouri River. According to the permit application, an estimated 753 million gallons per year (MGY) will be pumped to the WTP, with an estimated 730 MGY going to the potable water system after treatment. The water treatment process will include lime softening and settling; recarbonation and buffering; prefiltering followed by microfiltration; then the addition of fluoride, chlorine, and ammonia before going to the potable water system. Alum (sodium aluminate) may be used in the lime softening and settling treatment process. The use of polymers is not anticipated. There will be three microfiltration units (skids). A line diagram from the permit application showing the water treatment process and wastewater treatment is shown in Attachment A at the end of this statement of basis.

Sources of wastewater from the WTP include the following:

1. Softening clarifiers sludge blowdown (est. 261,000 gpy),

2. Recarbonation and buffer basins (possible overflow and wastewater from twice per year cleaning, inspection, and maintenance) (est. 155,000 gpy),

3. Prefiltering and microfiltration backwash (est. 21,000,000 gpy) and

4. Water drained from membrane filter unit (skid) prior to "enhanced flux maintenance" cleaning (EFM) and "clean-in-place" (CIP) cleaning:
   a. EMF Drain (est. 420,900 gpy) and
   b. CIP Drain (est. 27, 600 gpy)

5. Cleaning wastewater from the microfiltration units:
   a. Enhanced flux maintenance clean (EFM) (est. 525,210 gpy), and
   b. Clean-in-place (CIP) waste (est. 144,000 gpy). The chemicals used in the clean-in-place of the microfiltration units involves the use of first sodium hypochlorite and sodium hydroxide solutions, followed by citric acid and hydrochloric acid solutions.

All of these wastewaters go the settling pond system, which consists of 3 cells operated in parallel. Each cell is supposed to have an operational capacity of 103,400 cubic feet, which equals approximately 773,400 gallons. It is this writer's understanding that all the wastewater would be routed to one cell at a time until the solids retention capacity of that cell is reached, then the wastewater would be routed to another cell. The design of the WTP did not include provisions for adding chemicals to the wastewater going to the settling pond system to aid in the settling of solids. Discharges from the cells will be the result of overflow (i.e., will not be controlled) and are likely to be intermittent in nature. The permit application estimated the volume of wastewater to be discharged from the settling pond system to be about 23,000,000 gallons per year less settled sludge and evaporation losses. Sludge would be removed from the cells as necessary. The permittee has land to the east of the WTP, in Section 6, for disposal of sludge from the settling pond system.

The permit application was for two outfalls. Outfall 001 is the discharge from the settling pond system. The wastewater is to be piped from the settling pond system to a concrete headwall/outlet structure (with included riprap flow dissipation) adjacent to an unnamed ephemeral drainageway tributary to Fisher Creek. From the map submitted with the permit application, it appears to be approximately 200-300 feet from the point of discharge to Fisher Creek.

Outfall 002 is for the overflow from the clear well at the WTP. The permit application said the overflow from the clear well is anticipated to occur primarily during startup testing and infrequently thereafter. The quantities of overflow are unknown, but anticipated to be negligible. According to the permittee, the overflow from the clear well was not connected to the piping for the wastewater going to the sludge lagoons because of the potential for cross-contamination should the discharge piping to the sludge lagoons become backed up for any reason. There will be a high water alarm in the clear well. Outfall 002 is located on the east side of the WTP and the discharge would go to another unnamed ephemeral drainageway tributary to Fisher Creek. It appears to be approximately 0.1-0.2 miles from the outfall to the confluence with Fisher Creek.

Below are the pollutants that were listed in Part V of Form 2D and the anticipated concentrations. These are the pollutants that were agreed to by EPA Region 8 with the understanding that the permittee did not have to provide information on the other pollutants in Groups A and B because they are not believed to be present.

	Outfall 001		Outfall 002	
Pollutant	Max. Daily	Avg. Daily	Max. Daily	Avg. Daily
TSS, mg/L	30	<30	----	----
pH,	9.0	6.0-9.0	9.0	6.0-9.0
Residual Chlorine, mg/L	0.1	<0.1	2.5	<2.5
Aluminum, mg/L	1.0	<1.0	----	----
Ammonia	----	----	0.55	<0.55
Fluoride	----	----	1.0	<1.0

Receiving Waters

Both discharges go to unnamed ephemeral drainageways tributaries to Fisher Creek, a stream which flows into Oahe Reservoir on the Missouri River. The WTP is located near the headwaters of Fischer Creek. It is at least 6 stream miles from the WTP to the point where Fisher Creek flows into Oahe Reservoir. Based on the USGS topographic quadrangle, Fisher Creek is an intermittent stream and possibly ephemeral.

Water Quality Considerations

The Standing Rock Sioux Tribe does not have program authorization (treatment as state (TAS)) for water quality standards (WQS) that can be approved by the EPA. Furthermore, the Tribe has not developed WQS for the Standing Rock Indian Reservation. In the absence of water quality standards on the reservation, the EPA needs to consider protecting beneficial uses of the receiving waters. Section 101(a)(2) of the Clean Water Act states "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water to be achieved by July 1, 1983". The EPA regulations on water quality standards specify at 40 CFR Part 131.10(j) "A State must conduct a use attainability analysis as described in §131.3(g) whenever : (1) The State designates or has designates or has designated uses that do not include the uses specified in section 101(a)(2) of the Act, or (2) The State wishes to remove a designated use that is specified in section 101(a)(2) of the Act or to adopt subcategories of uses specified in section 101(a)(2) of the Act which require less stringent criteria." To this writer's knowledge, a use attainability analysis has not been done on these stream segments. Therefore, the beneficial uses of the receiving waters will be considered to include aquatic life and recreation.

A 2004 satellite image of the area shows a small in-stream impoundment on Fischer Creek, approximately ½ mile downstream from the discharge from Outfall 001. This indicates that Fisher Creek is used for livestock watering and that will be considered as a beneficial use.

The pollutants in the discharges from Outfalls 001 and 002 should not cause water quality problems in terms of recreational and livestock watering uses of the receiving waters. In terms of fresh water aquatic life, the pollutants of potential concern include total residual chlorine (TRC), ammonia nitrogen, and aluminum. Because the discharges will be intermittent in nature, only the acute criteria will be considered. The acute criterion for TRC is 0.019 mg/L. The chlorine is likely to decay in the settling pond system sufficiently to meet the criteria at Outfall 001, but the TRC concentrations at Outfall 002 most likely will exceed the 0.019 mg/L criterion.

Ammonia is likely to be present in any discharges from Outfall 002 due to the addition of ammonia to the water at the clear well prior to the water going to the distribution system. Ammonia is not likely to be present in the discharges from Outfall 001 since the water used for backwashing the filter and microfiltration systems is obtained prior to the addition of ammonia. The acute criterion for ammonia nitrogen is dependent on pH, but not on temperature. The chronic criterion is dependent on both pH and temperature. Since the facility is not yet operational, there are no data on the temperature, pH and ammonia nitrogen concentrations for the discharges from Outfalls 001 and 002. Hence, it is not reasonable to determine possible effluent limitations on ammonia nitrogen at this time.

The fresh water aquatic life acute criterion for aluminum is 0.75 mg/L. Aluminum is likely to be present in the discharge from Outfall 001 due to the use of alum in the treatment process. However it is not known if it is will be present in the discharges from Outfall 002 in sufficient concentrations to have reasonable potential to exceed the 0.75 mg/L criterion.

The State of South Dakota has classified the Missouri River from Big Bend Dam to the North Dakota border for (1) domestic water supply waters, (2) coldwater permanent fish life propagation waters, (7) immersion recreation waters, limited-contact recreation waters, and (11) commerce and industry waters. It is highly unlikely the pollutants from the two discharges would make it to the Missouri River in concentrations great enough to have a measurable effect on water quality.

Effluent Limitations

The technology based effluent limitations of likely concern for the discharges from Outfall 001 are total suspended solids (TSS), pH, and possibly oil and grease. The TSS could come from the sediment discharged into the settling pond system. A commonly used effluent limitation in permits for TSS for discharges from WTPs in Region 8 is 30 mg/L as a 30-day average and 60 mg/L as a daily maximum. That limitation is based on best professional judgement (BPJ) since there presently are no effluent limitation guidelines for discharges from WTPs. Because lime in the lime softening treatment process and hydroxides and acids are used in the cleaning of the microfiltration unit, pH of the discharge is of concern. The normally used technology based effluent limitation for pH is 6.0 – 9.0. The water quality criterion for pH for most aquatic life is 6.5-9.0. That limitation will be used in the permit. Although unlikely, oil and grease possibly could be present in the settling pond system due to oil leakage from pumps, etc. possible spillage within the WTP and/or activities around the settling pond system. The commonly used technology based effluent limitation in the EPA Region 8 for oil and grease is 10 mg/L with no visible sheen or floating oil. That limitation is based on BPJ. It is also protective of water quality. There will be an effluent limitation of 0.75 mg/L on total recoverable aluminum based on the acute water quality criterion for aquatic life. An effluent limitation based on the chronic criterion for total recoverable aluminum is not considered necessary to protect aquatic life in the receiving waters. The effluent limitation on TRC will be 0.019 mg/L based on the acute criterion for aquatic life. There will not be an effluent limitation unless future monitoring for ammonia, temperature, and pH show that there is a need for a limitation for the protection of aquatic life.

Because of the detention time in the settling pond system it is anticipated that all the effluent limitations for Outfall 001 can be meet effective immediately. The effluent limitations are shown in the table below.

Effluent limitations for Outfall 001

Effluent Characteristic	Effluent Limitation		Basis b/
	30-Day Average a/	Daily Maximum a/	
Total Suspended Solids, mg/L	30	60	BPJ
Total Residual Chlorine, mg/L	N/A	0.019	WQS
Aluminum, Total Recoverable, mg/L	N/A	0.75	WQS
The concentration of oil and grease in any single sample shall not exceed 10 mg/L nor shall there be any visible sheen in the receiving water or adjoining shoreline.			BPJ & WQS
The pH of the discharge shall not be less than 6.5 or greater than 9.0 at any time.			WQS

a/ See Definitions, Part 1.1, for definitions.
b/ BPJ = Technology based limit based on best professional judgement; WQS = Limitation based on protecting water quality

The discharge from Outfall 002 is the emergency overflow from the clear well at the WTP and expected to occur mainly during the initial startup of the WTP and be very infrequent after stable operating conditions of the WTP are achieved. Outfall 002 is located on the side of the WTP opposite of the settling ponds system. No treatment has been provided for the water being discharged from Outfall 002. The pollutants of potential concern include TRC, total recoverable aluminum, and possibly ammonia nitrogen. The permit application gave the expected maximum concentration of TRC and ammonia at 2.5 mg/L and 0.55 mg/L respectively. It is anticipated that the concentrations of aluminum will be significantly less than the acute water quality criterion of 0.75 mg/L. Accordingly, there will not be an effluent limitation on aluminum for Outfall 002, but monitoring will be required to verify that the effluent concentration of aluminum does not present a water quality concern.

The permit will require that the following conditions be met for Outfall 002:

There shall be no discharge from Outfall 002 except as the result of the overflow of the clear well. Any discharge from Outfall 002 shall be terminated as soon as reasonable and practicable after the permittee becomes aware of the discharge.

There shall be no discharge containing wastewater from the cleaning of the clear well.

Effluent Characteristic	Effluent Limitation		Basis b/
	30-Day Average a/	Daily Maximum a/	
Total Residual Chlorine, mg/L c/	N/A	0.019 c/	WQS
The pH of the discharge shall not be less than 6.5 or greater than 9.0 at any time.			WQS

a/ See Definitions, Part 1.1, for definitions.
b/ BPJ = Technology based limit based on best professional judgement; WQS = Limitation based on protecting water quality.
c/ Effective one year after the effective date of the permit.

With the exception of the limitation on TRC, this writer anticipates that there will be no problem in meeting the above numerical effluent limitations. It is up to the permittee to determine how best to meet the effluent limitation on TRC. The limitation on TRC will be effective one year after the effective date of the permit in order for the permittee to determine how to meet the limitation. It is very unlikely that there will be measurable amounts of oil and grease in the clear will and therefore there will be no effluent limitation on oil and grease. There will be no effluent limitation on ammonia unless future monitoring for ammonia, temperature, and pH show that there is a need for a limitation. There will not be an effluent limitation on total suspended solids (TSS) because the concentration of TSS in the water in the clear well should be very low and the permit prohibits the discharge of wastewater from the cleaning of the clear well. Monitoring for TSS will be required to verify that the TSS concentrations are low.

Self-Monitoring Requirements

The self-monitoring requirements for Outfall 001 are given in Part 1.3.2.1 of the permit. Because flow monitoring capabilities was not included in the design of Outfall 001, during the first year of the permit the permittee will only be required to report an estimate of the volume of water discharged (in gallons) during the reporting period. However, after one year, the permittee must have the capability to determine the rate of discharge and be able to demonstrate that representative values are being obtained. Instantaneous flow rates are to be monitored weekly, with the average flow rate and the maximum flow rate observed being reported. Monitoring frequency for TSS, aluminum, pH, and oil and grease will be monthly. For TRC the frequency initially is weekly. If the monitoring data for a six month period shows that the effluent limitation for TRC was met consistently, the permittee may request that the monitoring frequency for TRC be changed from weekly to monthly. The permit issuing authority may make this change without going to public notice. The permit requires that if the discharge is intermittent, the first sample of the month shall be collected as soon after the discharge begins as is reasonable and practicable.

The monitoring for oil and grease normally will be a visual observation for a sheen, floating oil, etc. The analysis for oil and grease is only required is a visible sheen, etc., is observed.

The permit requires that the analysis for TRC be done with an analytical method that has a minimum detection level of 0.10 mg/L. That can be achieved with the DPD spectrophotometric method. Because of the detection limitations on the analysis for TRC, the permit provides that in the calculation of average TRC concentrations, those analytical results that are less than 0.10 mg/L shall be considered to be zero for calculation purposes. If all individual analytical results that would be used in the calculations are less than 0.10 mg/L, then “less than 0.10 mg/L” shall be reported on the discharge monitoring report form. Otherwise, report the maximum value and the calculated average value.

The self-monitoring requirements for Outfall 002 are given in Part 1.3.2.2 of the permit. For flow the permit requires reporting the total number of discharges that occurred, the approximate accumulative duration of all discharges, in hours, and the estimated total volume of water discharged, in gallons. The intent is to obtain an idea of the total amount of time a discharge was occurring and an estimate of the total volume of water discharged.

The monitoring frequency for TRC for Outfall 002 is weekly and cannot be changed to monthly because of the potential for discharging relatively high concentrations of TRC. The monitoring frequency for

TSS, aluminum, and pH is monthly. No monitoring is required for oil and grease because it is highly unlikely to be present.

Special Monitoring Requirements

In order to obtain the data to determine if the discharges of ammonia from Outfalls 001 and 002 are a potential water quality concern, for the first 18 months, the permit requires monthly monitoring of both outfalls for ammonia, ph, and temperature. The pH and temperature data are necessary because the acute toxicity criterion for ammonia is pH dependent and chronic toxicity criterion is pH and temperature dependent. It is anticipated that ammonia toxicity will not be a problem, but data are needed to determine if it is or is not a problem.

Inspection Requirements

Part 1.3.3 of the permit has inspection requirements for the settling pond system. The basic intent of the inspection requirements is to ensure that the permittee is maintaining the integrity and operating capabilities of the settling pond system. If problems are observed, the permittee is expected to take the appropriate corrective measures. A log is to be maintained of inspections, observations, and corrective actions taken.

Endangered Species Act (ESA) Requirements

Section 7(a) of the Endangered Species Act requires federal agencies to insure that any actions authorized, funded, or carried out by an Agency are not likely to jeopardize the continued existence of any federally-listed endangered or threatened species or adversely modify or destroy critical habitat of such species. Federally listed threatened, endangered and candidate species found in Corson County, South Dakota include:

Group	Species	Status
Bird	Crane, Whooping	E
Bird	Plover, Piping	T (CH)
Bird	Tern, Least	E
Mammal	Ferret, Black-footed	E
Fish	Sturgeon, Pallid	E
Bird	Sprague's Pipit	C

E = Endangered, T = Threatened, C = Candidate, CH = Critical Habitat

The EPA finds that this permit is Not Likely to Adversely Affect any of the species listed by the US Fish and Wildlife Service under the Endangered Species Act. This facility discharges into unnamed ephemeral tributaries of Fisher Creek, which flows into the Missouri River. The permit limitations are protective of water quality and flows are expected to not be excessive.

National Historic Preservation Act (NHPA) Requirements

Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470(f) requires that federal agencies consider the effects of federal undertakings on historic properties. The EPA has evaluated its planned reissuance of the NPDES permit for the Fort Carson WWTF to assess this action's potential effects on any listed or eligible historic properties or cultural resources. The EPA does not anticipate any

impacts on listed/eligible historic properties or cultural resources because this permit is a renewal and will not be associated with any new ground disturbance or significant changes to the volume or point of discharge.

Miscellaneous

The permit will be issued for a period of approximately 5 years, but not to exceed 5 years, with the permit effective date and expiration date determined at the time of permit issuance.

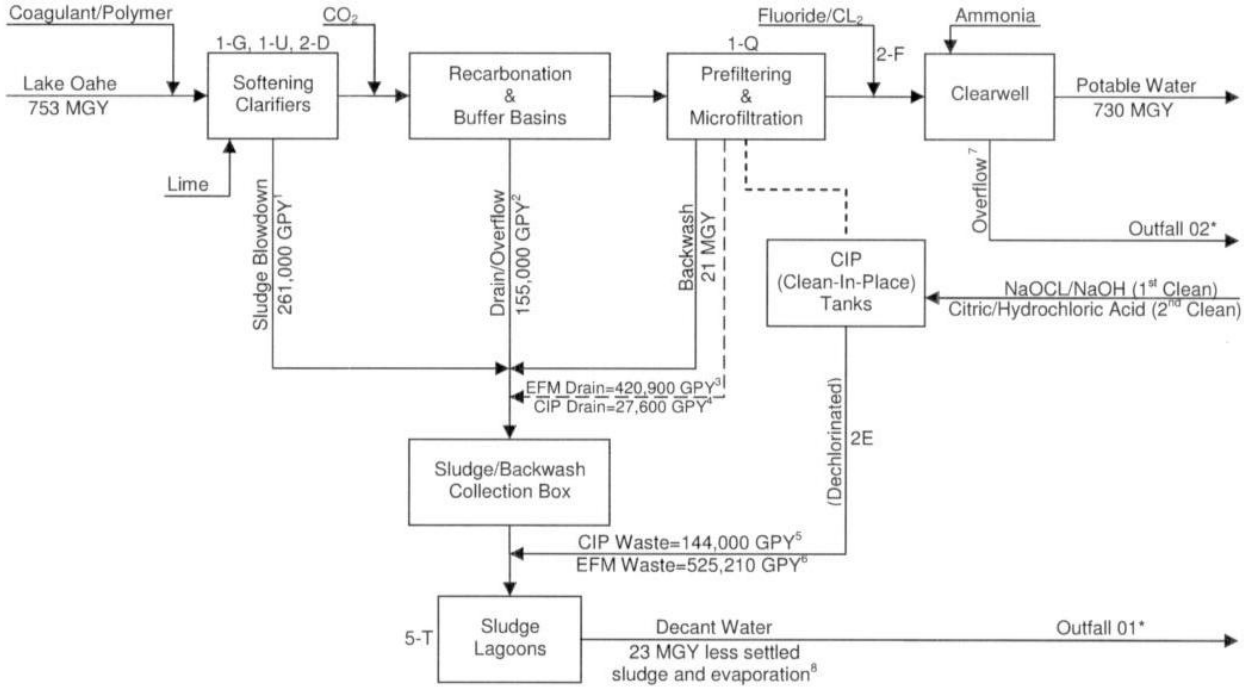
Permit drafted by Robert D Shankland, SEE, 8P-W-WW, EPA Region 8, July 6, 2011.

Permit reviewed by Bruce Kent, 8P-W-WW, EPA Region 8.

.

ATTACHEMENT A
Line Diagram of Water Treatment Process and Wastewater Treatment from the Permit Application

LINE DRAWING



*Outfalls discharge into an unnamed intermittent stream approximately 6.6 miles upstream from "Waters of the U.S." (Lake Oahe).

[1]Estimated sludge production at 1.5mgd (yearly average) = 6,880.5 lb/day. Assumed 25% semi-solid.

[2]Assumes 0 gal/yr for overflow and MF buffer/recarbonation basins drained twice per year for cleaning, inspection, and maintenance.

[3]Prior to an "enhanced flux maintenance" clean (EFM), water is drained from the membrane skid resulting in 1,150 gal per skid per clean. EFM's are estimated to be performed every 3 days or 122 times per year.

[4]Prior to a "clean-in-place" (CIP), water is also drained as above. CIP's are estimated to be performed every 45 days or 8 times per year.

[5]CIP's (clean-in-place) are estimated to be performed 8 times per year per skid and consist of cleaning solution and flush water.

[6]EFM's (enhanced flux maintenance clean) are estimated to be performed 122 times per year per skid and consist of cleaning solution and flush water.

[7]Overflow of potable water from clearwell will occur primarily during initial startup testing and only infrequently thereafter. Quantities unknown and anticipated to be negligible.

[8]The 23 MGY is based on anticipated year-round average with backwash water being the major constituent. Approximately 7-9 MG of this total are anticipated to be discharged during the summer months.