REGION C WATER PLANNING GROUP

MODEL WATER CONSERVATION PLAN FOR STEAM ELECTRIC POWER GENERATORS

DECEMBER 2024
Prepared for:

REGION C WATER PLANNING GROUP

Prepared by:

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FOREWORD

This model water conservation plan for the fictional Poca Agua Steam Electric Power Station was prepared by Plummer and Freese and Nichols for the Region C Water Planning Group. It is a template for steam electric power generators to use as they develop their own water conservation plans. Each steam electric power generator should customize the details to match their unique situation. The model plan was prepared pursuant to Texas Commission on Environmental Quality rules. The rules do not require a drought contingency plan for steam electric power generators.

Questions regarding this model water conservation plan should be addressed to the following:

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This model water conservation plan is based on the Texas Administrative Code in effect on December 5, 2024, and considers water conservation best management practices from the Texas Water Development Board's *Best Management Practices for Industrial Water Users*. Currently, the Water Conservation Advisory Council (WCAC) is reviewing additional Best Management Practices (BMPs) for industrial water users.

POCA AGUA STEAM ELECTRIC POWER STATION

WATER CONSERVATION PLAN

DECEMBER 2024

Prepared by:

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Water Conservation Plan

DECEMBER 2024

1. INTRODUCTION AND OBJECTIVES

Water supply has always been a key issue in the development of Texas. In recent years, the increasing population and economic development in Region C have led to growing demands for water supplies. At the same time, local and less expensive sources of water supply are largely developed. Additional supplies to meet higher demands will be expensive and difficult to develop. It is therefore important that we make efficient use of our existing supplies and make them last as long as possible. This will delay the need for new supplies, minimize the environmental impacts associated with developing new supplies, and delay the high cost of additional water supply development.

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has developed rules governing the development of water conservation plans for industrial and mining water use (Appendix B).[1] The Poca Agua Steam Electric Power Station has adopted this water conservation plan pursuant to TCEQ rules.

This model water conservation plan includes measures that are intended to result in ongoing, long-term water savings. Best management practices established by the Texas Water Development Board were also considered in the development of the water conservation measures.[2] This plan replaces a previous model plan dated August 2019.

This model plan is a template for industrial users to use as they develop their own water conservation plans. This model plan includes all of the elements required by TCEQ. Each industrial user should customize the details to match its unique situation. At a minimum, this will include:

- Setting five-year and ten-year goals for per capita water use (Section 6).
- Completing a water conservation implementation report (Section 13).
- Adopting ordinance(s) or regulation(s) approving the model plan (Section 13).

The final adopted version should be provided to the TCEQ.

The plan lists the TCEQ rules; describes the power generation process at the Poca Agua Steam Electric Power Station and associated water uses; sets a water conservation goal; describes water measurement devices and methods; discusses leak detection, repair, and water loss accounting; and reports existing and future water use efficiency practices.

[1] Superscripted numbers match references listed in Appendix A.

2. TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

The TCEQ rules governing development of water conservation plans for industrial or mining use are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.3 of the Texas Administrative Code (TAC), which is included in Appendix B. Holders of an existing permit, certified filing, or certificate of adjudication for the appropriation of surface water in the amount of 1,000 acre-feet a year or more for industrial uses must develop, submit, and implement a water conservation plan.

A water conservation plan is defined as "a strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s)[3]." The minimum requirements for water conservation plans for industrial or mining use are as follows:

TAC Reference	Subject	Plan Location
30 TAC §288.3(a)(1)	Production Process	Section 3, Appendix C
30 TAC §288.3(a)(2)	Water Conservation Goals	Section 4
30 TAC §288.3(a)(3)	Accurate Metering	Section 5
30 TAC §288.3(a)(4)	Leak Detection, Repair, and Water Loss Accounting	Section 6
30 TAC §288.3(a)(5)	Water Use Efficiency Process and/or Equipment Upgrades	Section 7
30 TAC §288.3(a)(6)	Other Conservation Practices	Section 8
30 TAC §288.3(b)	Review and Update of Plan	Section 9
30 TAC §288.30(2)	Water Conservation Implementation Report	Section 9

[TCEQ rules do not require a drought contingency plan for industrial or mining water users.]

3. DESCRIPTION OF THE WATER USES IN THE ELECTRIC GENERATION PROCESS

[This section must include a description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal. If your facility uses other cooling methods, such as once-through cooling or dry-type cooling, please amend the process description below. Also modify the water sources and water uses to match those at your facility.]

The Poca Agua Steam Electric Power Station is a natural gas-fired electric generating facility located at 4220 Poca Agua Road in the City of Poca Agua, Texas, on the south shore of Poca Agua Reservoir. The facility consists of one natural gas-fired, 300 megawatt (MW) steam electric generating unit that has been in service since 1972.

Water used for cooling and industrial uses is supplied with surface water from Poca Agua Reservoir, a man-made reservoir that was constructed in part to meet water demands from the generating facility. This water is used for cooling, boiler feed, fire protection, and service water. A water use diagram for the Poca Agua Steam Electric Power Station is presented in Appendix C.

Cooling water is pumped from Poca Agua Reservoir through the condensers and returned to the reservoir (a "once-through" cooling process). Service water is taken from the cooling water and used for boiler feed and miscellaneous purposes. Service water is treated using a reverse osmosis/demineralization process to create a high-purity boiler feed water. Reverse osmosis reject water and boiler blowdown are monitored and treated as necessary before being returned to the reservoir along with the cooling water.

Miscellaneous non-potable water uses include equipment washdown and fire protection. The amount of miscellaneous surface water use is estimated by multiplying the capacity of the service water pumps by their run times. Average flowrates under normal operating conditions are shown on the water use diagram in Appendix C.

Stormwater from the facility is collected and routed through oil-water separators, monitored, and discharged to the reservoir.

Potable water for domestic purposes is supplied by the City of Poca Agua. Wastewater treatment is provided by an on-site septic system.

The largest consumptive water use at the Poca Agua Steam Electric Power Station is forced evaporation from the once-through cooling process. The forced evaporation is estimated to be 0.35 gallons per kilowatt-hour (kWh) of generation[2]. The exact amount varies from year to year depending on the amount of power generated at the facility and climatic conditions. Assuming a 50 percent load factor, approximately 1,411 acre-feet per year (ac-ft/yr) of cooling makeup water is required.

Miscellaneous uses consume approximately 7 ac-ft/yr, and domestic uses consume an average of approximately 2 ac-ft/yr. Because water is used for fire protection on a very infrequent, as-needed basis, no average annual quantity has been estimated.

4. SPECIFICATION OF WATER CONSERVATION GOALS

[This section must include specification of 5-year and 10-year water conservation goals and the basis for development of such goals. The goals established by an industrial user under this subparagraph are not enforceable.

Please amend the water conservation goals, basis, and time frame to match those at your facility. Examples of methods that could be used to conserve water include switching to a higher quality source water for cooling tower makeup water, using advanced treatment processes to allow more cycling of process water and to reduce water waste, switching to reclaimed water as a source for most uses, water wise landscaping, retrofit of domestic plumbing fixtures with water-efficient fixtures, and employee education[3,4].]

The Poca Agua Steam Electric Power Station has set a five-year water conservation goal of reducing total water usage by ___ percent (from 1,411 ac-ft/yr to ____ ac-ft/yr assuming a 50 percent load factor) by _____ *[five years from date of plan]*. The ten-year goal is the same as the five-year goal. This will be achieved by _____ *[insert proposed water conservation methods]*.

[In response to a charge by the 82nd Texas Legislature, the Texas Water Development Board and the TCEQ, in consultation with the Water Conservation Advisory Council, developed water use and calculation methodology for preparation of water use reports and water conservation plans in accordance with TCEQ rules. The guidance document[4] contains a chapter on developing and evaluating water use in the industrial sector, including identifying total water use, appropriate metrics for evaluating water use, factors that may affect industrial water use, establishment of water conservation goals, and measurement of water savings.]

5. ACCURATE METERING TO MEASURE AND ACCOUNT FOR WATER

[This section must include a description of the device(s) and/or method(s) within an accuracy of plus or minus five percent to be used to measure and account for the amount of water diverted from the source of supply. Please amend the metering description to match those at your facility.]

The Poca Agua Steam Electric Power Station estimates water usage by multiplying pump run times and pump capacity (from manufacturers' pump curves). This is the best available technology for measuring cooling water flows that can reach 360 million gallons per day when the plant is operating at full capacity. Daily cooling water flows are reported to the Texas Commission on Environmental Quality (TCEQ).

Domestic water supply obtained from the City of Poca Agua is metered by the City. The meter is calibrated according to the City's schedule and specifications.

6. LEAK DETECTION, REPAIR, AND WATER LOSS ACCOUNTING

[This section must include a description of leak-detection, repair, and water loss accounting in the water distribution system. Please amend the description below to match operations at your facility.]

At the Poca Agua Steam Electric Power Station, leaks are identified through the following methods:

- Plant personnel routinely observe, operate, and maintain facilities throughout the day. Inspection of aboveground piping and pump packing is a normal part of employee duties.

- Plant personnel collect water samples from various points in the process and have them analyzed for key water quality parameters. Water quality problems can be indicative of water leaks.

- Operators monitor the water level in various ponds and sumps. A large change in water level can also signify a water leak.

If a water leak is indicated by any of the above means, the source of the leak is investigated and a work order for repairs is issued as necessary.

7. WATER USE EFFICIENCY PROCESS AND/OR EQUIPMENT UPGRADES

[This section must include a description of equipment and/or process modifications to improve water use efficiency. Please amend the description below to match operations at your facility.]

Several water conservation methods are already in use at the Poca Agua Steam Electric Power Station, including the following:

- Cooling water is pumped from Poca Agua Reservoir through the condensers and returned to the reservoir (once-through cooling). Much of the cooling water returned to the reservoir is eventually drawn into the cooling water intake and reused for cooling purposes.

- Water/steam is circulated through the boiler process multiple times to reduce water usage.

- Chemical dosages and concentrations are closely monitored to allow maximum cycling of boiler water/steam without scaling or corrosion.

- Reverse osmosis treatment equipment has been placed ahead of the demineralizer in the boiler feed treatment process to increase the run time of the demineralizer between regeneration events. This has extended the run time of the demineralizer by a factor of ten and has resulted in 90 percent less water wasted from the regeneration process.

- Boiler wash water is recycled.

- Stormwater, floor/equipment drainage, and miscellaneous low-volume wastes are passed through oil-water separators and discharged back to the reservoir under an existing Texas Pollutant Discharge Elimination System (TPDES) permit. Much of this water is eventually drawn into the cooling water intake and reused for cooling purposes.

- Landscape areas around the generating station are not irrigated.

8. OTHER CONSERVATION PRACTICES, METHODS, OR TECHNIQUES

[This section must include any other water conservation practice, method, or technique that the user shows to be appropriate for achieving the stated goal(s) of the water conservation plan. Please amend the description below to match operations at your facility.

Best management practices established by the Texas Water Development Board should also be considered in the development of the water conservation measures.[2]]

No other water conservation methods are necessary to achieve the water conservation goals for the Poca Agua Steam Electric Power Station.

9. IMPLEMENTATION OF THE WATER CONSERVATION PLAN

Appendix D contains a copy of the Water Conservation Implementation Report for the Poca Agua Power Company. *[From 30 TAC §288.30(2), an implementation report for industrial use must include the following:*

- *The list of dates and descriptions of the conservation measures implemented;*
- *Data about whether or not targets in the plans are being met;*
- *The actual amount of water saved; and*
- *If the targets are not being met, an explanation as to why any of the targets are not being met, including any progress on that particular target.]*

Appendix E contains a copy of the resolution of the Board of Directors of the Poca Agua Power Company adopting this water conservation plan. The resolution designates responsible officials to implement and enforce the water conservation plan.

Appendix F contains a copy of a letter to the chairman of the Region C Water Planning Group to inform the planning group of this water conservation plan.

This plan will be reviewed and updated every five years.

Appendix A
List of References

List of References

1. Texas Commission on Environmental Quality: "Water Conservation Plans for Industrial or Mining Use," *Texas Administrative Code* Title 30 Part I Subchapter A §288.3, effective December 6, 2012.

2. Texas Water Development Board: *Best Management Practices for Industrial Water Users*, Austin, [Online] Available URL: https://www.twdb.texas.gov/conservation/BMPs/Ind/doc/IndMiniGuide.pdf, February 2013.

3. Texas Commission on Environmental Quality: "Definitions," *Texas Administrative Code* Title 30 Part I Subchapter A §288.1, effective August 16, 2018.

4. Texas Water Development Board and Texas Commission on Environmental Quality in consultation with Water Conservation Advisory Council: *Guidance and Methodology for Reporting on Water Conservation and Water Use*, Austin, [Online] Available URL: http://www.twdb.texas.gov/conservation/doc/SB181Guidance.pdf, December 2012.

Appendix B

Texas Commission on Environmental Quality Rules on Water Conservation Plans for Industrial or Mining Water Use

Appendix C
Water Use Diagram

Water Use Diagram
Poca Agua Steam Electric Power Station

[Insert water use diagram here. Show all water uses, sources, and flowrates.]

Appendix D
Water Conservation Implementation Report

Water Conservation Implementation Report
Poca Agua Steam Electric Power Station

[Insert water conservation implementation report here. The implementation report must include the following:

- *The list of dates and descriptions of the conservation measures implemented;*
- *Data about whether or not targets in the plans are being met;*
- *The actual amount of water saved; and*
- *If the targets are not being met, an explanation as to why any of the targets are not being met, including any progress on that particular target.]*

Appendix E
Board Resolution Adopting the Water Conservation Plan

[Insert Board resolution adopting the water conservation plan.]

Appendix F
Letter to the Region C Water Planning Group

[Insert letter to the Region C Water Planning Group.]