VERRADO WATER RECLAMATION FACILITY (WRF)
Aquifer Protection Permit No. P-105202
Place ID 16908, LTF No. 94502
SIGNIFICANT AMENDMENT

I. Introduction:

The Arizona Department of Environmental Quality (ADEQ) proposes to issue an Aquifer Protection Permit (APP) for the subject facility that covers the life of the facility, including operational, closure, and post-closure periods unless suspended or revoked pursuant to Arizona Administrative Code (A.A.C.) R18-9-A213. The requirements contained in this permit will allow the permittee to comply with the two key requirements of the Aquifer Protection Program: 1) meet Aquifer Water Quality Standards (AWQS) at the Point of Compliance (POC); and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). BADCT's purpose is to employ engineering controls, processes, operating methods or other alternatives, including site-specific characteristics (i.e., the local subsurface geology), to reduce discharge of pollutants to the greatest degree achievable before they reach the aquifer or to prevent pollutants from reaching the aquifer.

II. Permittee & Facility Location:

EPCOR Water Arizona, Inc. Owns and operates the Verrado Water Reclamation Facility (WRF), located at 1871 N. Lancaster Street, Buckeye, Arizona, Maricopa County, over groundwater of the Phoenix Active Management Area. The Verrado WRF is located on County Parcels 502-78-009B, while Vadose Zone Well #1 is located on Parcel 502-78-890 and Vadose Zone Well #2 is located on Parcel 502-78-889, and the property owner for all three parcels is Arizona American Water Company. Property/assets were obtained via stock purchases by EPCOR Water, Arizona, Inc. so the property name has remained the same on the deed.

III. Facility Description:

The permittee is authorized to operate the Verrado Water Reclamation Facility, with a maximum average monthly flow of 1.46 mgd for Phase 4A, 1.85 mgd for Phase 4B, 2.6 mgd for Phase 5, and 3.12 mgd for Phase 6. The ADEQ has graded this facility as a Grade 4 wastewater treatment plant. The facility shall have an operator in direct responsible charge who is certified for the grade of the facility and visits the facility daily.

Phase 4A (1.46 mgd ADMM) Migrating Biofilm Carrier (MBC) Activated Sludge Process

The Verrado WRF headworks consists of two influent pump stations (IPS) wet wells, each with two 810 gpm pumps (3-duty, 1-standby) and a 3rd pump base in IPS #2, a mechanical step screen (5.5 mgd) with screenings washer and compactor, a bypass manual bar screen, and a vortex grit chamber (5.5 mgd) system with a grit washer and concentrator that dumps into a roll off bin for disposal. One of the IPSs is at a lower elevation to provide extra storage and minimize pump cycling. IPS #1 overflows a weir and enters IPS #2. Flows over a predetermined setpoint of 1.83 mgd (1,271 gpm) overflow into two 0.73-million-gallon equalization basins with a 50-hp blower, and 25-hp blower (1-duty, 1-standby) that has a pump station with two 700-gpm VFD controlled pumps, with a spare on the shelf.

From the headworks, preliminary treated influent is delivered to an anoxic zone junction box that splits flows between two bio-nutrient reactor (BNR) treatment trains that have been modified with

a migrating biofilm carrier (MBC) process. Each BNR have three anoxic zones (A, B, and C) and an aerated zone with three aerated swing zones (1,2, and 3) to achieve nitrification/denitrification. The anoxic zones utilize jet motive pumps to keep the mixed liquors in suspension. Three 100-hp blowers (2-duty, 1-standby) deliver oxygen to both BNR aerobic zones, and mixing is provided with jet motive pumps to keep the mixed liquors in suspension and distribute the air through a single jet aeration header fitted with dispersion nozzles with three aeration drop legs/swing zones. An IMLR pump transfers mixed liquors from the end of the aerated zone back to the head of the anoxic zone. Two new activated sludge intensification process media screens (1-duty; 1-standby) will be installed at the top of the beginning of the aeration zones. The media will recycle through the IMLR pumps back through the anoxic zones. A carbon feed system is available with a 750-gallon storage tank and a 5-gph feed pump to deliver an additional food source to assist with denitrification at all three oxic swing zone locations.

MLSS is split between two clarifiers (1-duty; 1-standby) which can support Phase 4A and Phase 4B, because the intensification process is expected to achieve higher loadings due to the enhanced settling of the ballasted media. These clarifiers share a RAS pump station, with existing 305-gpm (3.7-hp VFD controlled) RAS pumps dedicated to each and a third redundant pump when the dedicated pump is out of service. Two new 100-gpm (3-hp VFD controlled) RAS pumps deliver the activated sludge to the top of the aeration basins sludge intensification screens. From these sludge intensification screens, ballasted media will be separated from the WAS and returned to the oxic basins. The screened WAS flow is conveyed by gravity to the sludge holding tanks according to influent flow and have been sized for all phases covered by this permit. The sludge will be stored and manually decanted from the existing 151,000 gallon sludge holding tank with two rotary lobe blowers (1-duty; 1-standby) with 9-inch EPDM fine bubble diffusers. Two dry-pit 7.5-hp rotary lobe pumps then pump the sludge to a 1.0-meter belt filter press, or back-up 0.5-meter belt filter press for dewatering. The dewatered sludge is disposed off-site at an approved landfill.

Effluent from the clarifiers is delivered to a 10,000-gallon filter influent pump station with two 2,200-gpm pumps (1-duty, 1-standby), which raises the hydraulic grade line so that effluent flows by gravity through one of two (Filter 3 and Filter 4) 2.2-meter tertiary disc-filters (each with a 2.31 mgd capacity through 8 disks to support Phase 4A and 4B) and two chlorine contact tanks (each with three passes) to the effluent pump station. Sodium hypochlorite (NaOCl) solution, stored in a 2,000 gallon tank, is injected upstream of the contact tank in the 18-inch filter effluent header. An 18-inch static mixer provides instantaneous mixing of the chlorine and filtered effluent. The facility uses sodium bisulfite for effluent dechlorination. The 18,000-gallon effluent pump station with two 1,900-gpm (4-stage 200-hp VFD controlled) vertical turbine pumps (1-duty, 1-standby), delivers reclaimed water meeting the Class A+ Reclaimed Water Standards as per Title 18, Chapter 11, Article 3. The effluent may be delivered for beneficial purposes (reuse) under a required valid Class A+ reclaimed water permit or to the two (2) vadose zone wells at the aquifer recharge facility (ARF), located approximately one mile north-northwest of the facility, or to the outfall within the Lost Creek Wash. When discharged only for reuse, the effluent is delivered directly from the chlorine contact chamber and does not require dechlorination. However, during times in which the effluent is discharged to the ARF, the effluent should be dechlorinated to reduce TTHMs, so dechlorination storage and dosing equipment is required at this facility for all phases included in this permit.

A single 12,700 cfm multi-stage wet scrubber odor control system uses sodium hydroxide and sodium hypochlorite to treat foul air ventilated from all odor producing processes. Electrical service is brought in through a main switchboard sized at 1,600-amps, supporting Switchboard 1 and service entrance switchboard sized at 3,000 amps, supporting Switchboard 2. Backup power is provided by a 1,000-kW standby diesel generator on Switchboard 1 and a 2,000-kW standby diesel generator on Switchboard 2. Both the odor control system and generators will be sufficient for Phase 4A and 4B.

Phase 4B (1.85 mgd ADMM) MBC Activated Sludge Process

For Phase 4B, the Verrado WRF will be adding a third influent pump to the existing pump base in IPS #2 Wetwell. No changes will occur to the preliminary treatment, the predetermined set-point for flows to the EQ basins will be changed to 2.30-mgd (1,604-gpm). The equalized influent pumps will be upsized to 1,150 gpm (20 hp; VFD controlled). The anoxic basin jet mixing system will be upgraded to a jet aeration system to allow the three anoxic zones to serve as additional aerated swing zones doubling the number of nozzles in each basin (Zone A will now have four nozzles, Zone B-four nozzles, and Zone C-eight nozzles), the IMLR pumps will be upgraded from 5 hp to 5.5 hp pumps, the process air blowers will be upgraded with three (2-duty; 1-standby) 1,750 scfm (125 hp) variable speed hybrid rotary lobe blowers, The RAS pumps will be upgraded to 3 new (2-duty; 1-standby) 650 gpm (7.5 hp VFD operated) horizontal dry-pit RAS pumps.

Phase 5 (2.60 mgd ADMM) MBC Activated Sludge Process

For Phase 5, the Verrado WRF will be adding a third permanent pump to Wetwell 2 (4-duty; 1-standby), a 3mm mechanical stair screen with wash compactor and 2nd bypass barscreen will be added to the 6mm stair screen with washer compactor and bypass barscreen already in service. The predetermined set-point for flows to the EQ basins will be changed to 3.25-mgd (2,257-gpm). The equalized influent return pumps will be upgraded from two dry pit to two submersible 1,500 gpm (20 hp; VFD controlled) pumps and the 50-hp standby equalization blower will be replaced by a 25-hp swing blower, so that 2-blowers (25-hp each 1-duty; 1-swing) can provide air to the equalization basin. A third oxic basin utilizing the migrating media treatment process will be added in order to increase the capacity of the WRF, which will then have two anoxic basins with three zones and three oxic basins, each with two aeration zones and one anoxic swing zone. A 5-hp submersible IMLR pump will be installed and a new process media retention screen will be added to new Oxic Basin 3. The bioreactor glycerin feed storage will be doubled to 1,500 gallons of storage and a 10 gph feed pump that can deliver up to a 12 gph design point to support Phase 5 and Phase 6.For the process air blowers, a 75hp jockey blower (duty) will be added to the three 125-hp blowers. A third clarifier (2-duty; 1-standby) will be added to support Phase 5 and 6. A new 650 gpm (7.5 hp VFD operated) horizontal dry-pit centrifugal RAS pump (3-duty; 1-standby) will be added to serve the new Phase 5 oxic basin. The pumps for the filter influent pump station will be increased from 2,200 gpm to 2,300 gpm. An additional 2.2-meter tertiary disc-filter with 6 disks for an additional capacity of 1.83 mgd (Filter 5) will be added to support Phase 5 and 6. A third chlorine contact tank will be added to support Phase 5 and 6. The standby sodium hypochlorite pump will become duty, and a third pump will be ready on the shelf for use. In the reclaimed water pump station, a 500 gpm (4-stage 60-hp VFD controlled) vertical turbine jockey pump will be installed to help support the 1,900 gpm duty/standby reclaimed pumps.

For Phase 5, the existing equipment gallery will be converted to a new sludge holding tank and new pumped floating decanters will be installed in this tank and the existing tanks. The two outdoor blowers will be replaced with two larger 975-scfm; 50-hp blowers (1-duty; 1-swing) located indoors at the existing repurposed maintenance building and stainless steel coarse bubble diffusers will be installed in both tanks, replacing the EPDM fine bubble diffusers. Two new 7.5 hp submersible rotary lobe pumps (1-duty; 1-standby) will be installed in the new tank, while the existing tank continues to use the existing 7.5 hp dry-pit rotary lobe pumps to deliver thickened sludge to the belt filter presses.

For Phase 5 and 6, new (second sized identically) 12,700 cfm multi-stage wet scrubber odor control system will be installed and the acid storage tank and feed will be relocated closer to road access. Additional generator capacity (diesel generator) will be added for Phase 5 and 6.

Phase 6 (3.12 mgd ADMM) MBC Activated Sludge Process

For Phase 6, the Verrado WRF will be adding a third pump to wetwell 1, for a total of 3 pumps in each wetwell (5-duty; 1-standby). The predetermined set-point for flows to the EQ basins will be changed to 3.90-mgd (2,708-gpm). a third submersible 1,500 gpm (20 hp; VFD controlled) equalization influent return submersible pump will be added to the equalization wetwell. A fourth oxic basin utilizing the migrating media treatment process will be added in order to increase the capacity of the WRF, which will then have two anoxic basins with three zones and four oxic basins, each with two aeration and one anoxic swing zone. A 5-hp submersible IMLR pump will be installed and a new process media retention screen will be added to new Oxic Basin 4. For process air, the 75-hp duty blower will be replaced with another 125-hp blower so that there are 4 125-hp hybrid rotary lobe blowers (3-duty, 1-standby). A new 650 gpm (7.5 hp VFD operated) horizontal dry-pit RAS pump (4-duty; 1-standby) will be added to serve the new Phase 5 oxic basin. In the filter influent pump station, a third 500 gpm (5-hp VFD controlled) jockey pump will be installed as a secondary duty pump to support the existing 2,300 gpm duty/standby pumps. In the reclaimed water pump station, a second 500 gpm (4-stage 60-hp VFD controlled) vertical turbine jockey pump will be installed to help support the 1,900 gpm duty/standby reclaimed pumps, for a total of 4 reclaimed water turbine pumps.

All industrial hookups and other non-residential hookups to the treatment system shall be authorized according to the applicable federal, state or local regulations.

IV. Amendment Description:

The purpose of this amendment is to rerate the Verrado WRF from 1.22 mgd to a maximum average monthly flow of 1.46 mgd for Phase 4A, 1.85 mgd for Phase 4B, 2.6 mgd for Phase 5, and 3.12 mgd for Phase 6, utilizing an MBC technology that is being presented in Arizona for the first time.

These improvements included adding and modifying equipment to meet the new performance criteria, and adding screens and pumps to maintain the biofilm carrier in the process and waste the activated sludge by gravity after the media is screened.

Performance testing of this new treatment process will be performed and submitted to ADEQ as required by Compliance Schedule Item #1.

V. Regulatory Status

This amendment is in response to routine flow monitoring alert levels being reached, and capacity assurance concerns with Maricopa County Environmental Services Department. There are currently no regulatory notices issued by the ADEQ.

VI. Best Available Demonstrated Control Technology (BADCT):

The treatment facility shall be designed, constructed, operated, and maintained to meet the treatment performance criteria for new facilities as specified in A.A.C. R18-9-B204. The facility shall meet the performance requirement for industrial pre-treatment as per A.A.C. R18-9-B204(B)(6)(b).

When discharged only for reuse, the effluent is delivered directly from the chlorine contact chamber and does not require dechlorination. However, during times in which the effluent is discharged to the ARF, the effluent should be dechlorinated to reduce TTHMs, so dechlorination storage and dosing equipment is required at this facility for all phases included in this permit.

VII. Compliance with Aquifer Water Quality Standards (AWQS):

The depth to groundwater is approximately 230 feet below ground surface (bgs) at the WRF and 330 feet bgs at the ARF. Groundwater at the WRF appears to flow south-southeastward, and at the ARF appears to flow north-northeastward toward a hydraulic sink. Groundwater monitoring is required at POC # 2; MW #1, within 300 feet east of the Aquifer Recharge Facility vadose zone recharge wells. Groundwater monitoring is not required at POC#1 and POC #3 unless an additional point of compliance is required.

The site includes the following permitted discharging facilities:

Table 1: DISCHARGING FACILITIES

Facility	Latitude (North)	Longitude (West)
Verrado WRF	33° 28' 04.6"	112° 29' 52.1"
Vadose Zone Well #1	33° 28' 45.6"	111° 30' 27.4"
Vadose Zone Well #2	33° 28' 45.3"	111° 30' 27.2"
Lost Creek Wash Outfall	33° 29' 23.4"	111° 30' 38.7"

The Points of Compliance (POCs) have been established at the following locations:

Table 2: POINT(S) OF COMPLIANCE

POC #	POC Location	Latitude (North)	Longitude (West)
1 (Conceptual)	Southeast Corner of the WRF	33° 28' 02"	112° 29' 52"
2	MW #1, within 300 feet east of the Aquifer Recharge Facility vadose zone recharge wells	33° 28' 46"	112° 30' 28"
3 (Conceptual)	Approximately 650 feet southeast of the Lost Creek Wash Outfall	33° 29' 19"	112° 30' 17"