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M e m o r a n d u m

To: High Desert Power Project Parties **Date** : August 11, 2017

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Subject: ENERGY COMMISSION STAFF'S PROPOSED STIPULATION LANGUAGE FOR THE HIGH DESERT POWER PROJECT (HDPP, 97-AFC-01C) RECYCLED WATER USE

The parties have attempted to come to agreement on stipulated language in the HDPP soil and water conditions of certification. This memo documents the positions, but not full agreement, of the California Energy Commission Staff (staff) and, we believe, the California Department of Fish and Wildlife (CDFW) and the HDPP project owner, regarding the recycled water use and water banking requirements for the High Desert Power Project.

1. The project owner and the agencies agree on the maximum recycled water use in any one year and over a three-year rolling average (2500 acre feet per year (AFY) and 2000 AFY, respectively). The maximum is a fixed number and does not vary with changes in total project water use. Proposed edits to HDPP condition SOIL&WATER-1 are shown in the attachment.

2. The project owner and the agencies appear to disagree on the amount of the penalty for non-compliance with the maximum or minimum amounts allowed under proposed revisions to SOIL&WATER-1. CDFW has indicated that the consequence of missing the maximum or minimum be tied to water availability and cost in Victorville. Therefore, staff has proposed edits to HDPP condition SOIL&WATER-1, shown on the attachment, that start the penalties at $500 per each AF above the maximum, or below the minimum, and includes an annual escalator to account for the likelihood that water in California will only get more expensive. CDFW supports both the initial amount and an escalator.

3. The project owner and staff disagree on the annual limit for the minimum use of recycled water. The project owner has stated the project cannot operate successfully if the minimum recycled water limit is greater than 20 percent of total annual water use for process cooling. At the June status conference, the project owner offered to provide HDPP technical staff to discuss with the parties the HDPP operating conditions limiting recycled water use percentages. The project owner subsequently denied staff's request to meet with the project operators to discuss how HDPP determined the limiting minimum recycled water number of 20 percent.

   While staff does not have access to HDPP information and experts, staff reviewed recycled water historic consumption, including 2014. The historical data and other facts clearly show that the plant can meet and exceed 20 percent minimum recycled water.

As shown in Figure 1 below for calendar year 2014, in the middle of the recent California drought, the project used about 3,000 AFY of water for process cooling, of which, 38 percent or about 1,140 AFY was recycled water.

a. In August 2014, a month with a high capacity factor and water use, the project achieved 60 percent of its monthly process water use as recycled water.
b. In 2014, there were months (see figure below) where the project used more than 50 percent recycled water, including periods where the project was operating with both a high capacity factor and high water demand and low capacity factor and low water demand.
c. These percentages of recycled water use were achieved even though the predominant supply used for blending was delivered SWP water, which the project owner claims is of lower quality and not as easily blended as groundwater or banked SWP water.
d. With percolation added as a banking method, the project now has reliable access to high/consistent quality water (recovered banked water, which is basically Mojave groundwater) that is of higher quality than the SWP water. This should allow for easier blending of recycled water, potentially allowing the project to use more recycled water given existing plant equipment.
e. Additionally, the reduction or elimination of injection banking reduces or eliminates the added TDS to the HDPP process water cycle from the injection clean-up process waste water stream.

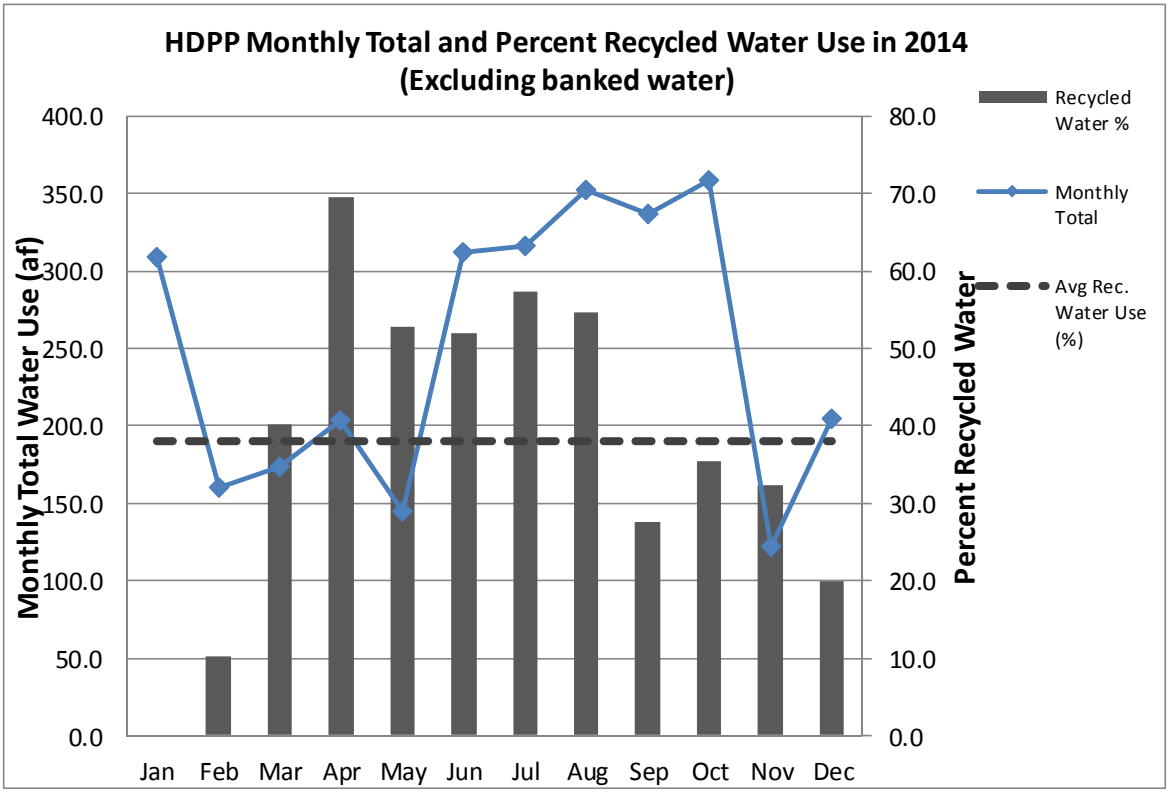

Figure 1 Total monthly water use and recycled water percentage in 2014

f. Lastly, the project owner claims the project cannot commit to more than 20 percent minimum recycled water use, because at low plant loads, the City of Victorville (CVV), the supplier of the recycled water, cannot reliably deliver recycled water at the low flow rates. At recycled water flow rates to HDPP of less than 300 gallons per minute (gpm), the chlorine injection pump in use by CVV cannot adjust fast enough to respond to abrupt changes (up and down) in recycled water demands by the project and it therefore creates a short term fluctuation in chlorine concentrations that could result in corrosive conditions (i.e., excess chlorine) in the cooling tower water. It should be noted that the additional chlorine disinfection is a requirement of the project owner and is not done to satisfy any technical or legal requirements for delivery of recycled water from CVV. Based on input from CVV, the limitation could be resolved by simply adding a smaller chlorine pump to work in parallel with the existing pump to handle flows below 300 gpm. CVV has told staff that the fix would cost about $1,000, mostly for labor.

In an effort to facilitate a negotiated agreement between the parties, staff is proposing edits to HDPP condition SOIL&WATER-1 as shown in the attachment, that agree to a minimum annual recycled water use of 20 percent. Since staff is willing to agree to 20 percent, which is readily achievable, staff is recommending modification of the chlorine injection system and incorporation of a loading sequence, discussed below, to ensure available recycled water is used.

4. The Project Owner had proposed a loading sequence (TN 210088) where recycled water is used, if available and of sufficient quality, as the first choice, followed by SWP water if available and of sufficient quality, and followed by banked water (injected and percolated). According to the loading sequence proposed by the project owner, recycled water would be used as the primary water supply, and SWP water and banked water (injection bank and percolation bank) would be used as backup supplies to be blended in with the recycled water. The project owner had offered an objective method for deciding when to blend in higher quality water based on the blowdown rate and the chloride levels in the cooling tower water.

   Staff is opting to re-insert the loading order and the proposed objective criteria as a reasonable method to ensure that use of available recycled water would be maximized. Staff notes that maximization of the recycled water use should be done in a way such that the 2,500 AFY annual maximum and the 2,000 AFY 3-year rolling average maximum requirements agreed upon by staff, the CDFW, and project owner are not exceeded. Proposed edits to HDPP condition SOIL&WATER-1 are shown in the attachment that incorporate the loading order.

5. The project owner and the agencies agree to proposed edits to HDPP conditions SOIL&WATER-4, 5, and 13, as shown in the attachment that incorporates percolation banking and recovery into HDPP water supplies.

Attachment: California Energy Commission Staff Proposed Stipulation Language for the High Desert Power Project Conditions of Certification SOIL&WATER-1, 4, 5, 6, 13, 22.

California Energy Commission Staff Proposed Stipulation Language for the High Desert Power Project Conditions of Certification SOIL&WATER-1, 4, 5, 6, 13, 22

SOIL&WATER-1 Water Supplies

The only water used for project operation (except for domestic purposes) shall be State Water Project (SWP) water obtained by the project owner consistent with the provisions of the Mojave Water Agency's (MWA) Ordinance 9 and/or appropriately treated recycled waste water., and/or an alternative water supply obtained from the Mojave River Basin (MRB) consistent with the "Judgment After Trial" dated January 1996 in City of Barstow, et al., v. City of Adelanto, et al. (Riverside County Superior Court Case No. 208568) ("MRB Water Rights") as administered by the Watermaster (the "Judgment").

b. The project owner shall implement an interim "Loading Sequence" in the following order:

a. 1. The project owner will**shall** use recycled waste water as the primary water supply, to the extent it is available and its quality is sufficient to maintain cooling tower functions and reliable operation of the facility**, provided that the use of recycled waste water:**

1. **shall not exceed 2,500 acre-feet per year (AFY) in any calendar year (the "Maximum Annual Recycled Water Use");**
2. **shall not exceed 2,000 AFY calculated on 3-year calendar year rolling average (the "Average Annual Recycled Water Use"); and**
3. **shall meet a minimum of 20 percent (%) of annual cooling water needs, excluding periods recycled water is not available or is not of sufficient quality, calculated on a three-year rolling average basis (the "Average Annual Recycled Water Blend Percentage")**.

If any of these three criteria are not satisfied for reasons other than those described in the following paragraph, project owner shall make a financial payment to California Department of Fish and Wildlife (CDFW) by March 1 for the previous calendar year for deposit in a High Desert Power Project Mitigation and Protection Expendable Funds Account established by CDFW pursuant to Fish and Game Code section 13014(b)(1)(E) as follows: (a) $500 per AF of Recycled Water used in excess of 2,500 AFY in any calendar year; (b) $500 per AF of Recycled Water used in excess of 2,000 AFY calculated on a three year rolling average; or (c) $500 per AF difference between 20% of total HDPP project industrial annual water use and total Recycled Water used in the calendar year. The amounts listed herein are in 2017 dollars and will be adjusted for inflation using the Consumer Price Index

However, if any of these three criteria are not satisfied because of an extensive, unavoidable disruption of water supply due to an Act of God, a natural disaster, an emergency, or other unforeseen circumstance outside the exclusive control of the project owner, the CPM, project owner, and CDFW shall meet and determine how best to restore water use in compliance with the terms of SOIL&WATER-1

as soon as practicable

The Maximum Annual Recycled Water Use, the Average Annual Recycled Water Use and Average Annual Recycled Water Blend Percentage shall be calculated and reported based on the metered data. The project owner shall exclude from the calculations (1) water used when recycled water is unavailable when the project requests recycled water; and (2) water used when recycled water of sufficient quality is unavailable when the project requests recycled water per the water quality specification in the project owner's agreement with its retail water supplier. Recycled Water unavailability shall be logged by the facility's operators and reported monthly to the Energy Commission Compliance Project Manager (CPM).

b. ~~2. If there is insufficient recycled waste water of quality or quantity sufficient to maintain cooling tower functions and reliable operation of the facility, r~~**R**ecycled waste water may be blended with either (a) directly available SWP water or (b) banked SWP Water **that has been either percolated or injected ("Banked SWP Water") and is available for extraction in accordance with SOIL&WATER-6.** ~~from the four HDPP wells as long as the amount of banked SWP water used does not exceed the amount of water determined to be available to the project pursuant to SOIL&WATER-5.~~

~~3. If there is insufficient directly available SWP Water of quality or quantity sufficient to maintain cooling tower functions for reliable operation of the facility and the amount of banked SWP water determined to be available to the project pursuant to SOIL&WATER-5 is less than 4,000 acre-feet (AF) in water year 2015/2016 (ending September 30, 2016) and less than 5,000 AF in water year 2016/2017 (ending September 30, 2017), the project owner may blend recycled waste water with MRB Water Rights to achieve the required cooling tower blowdown rate or cooling tower functionality, subject to the limitations contained above.~~

~~4. The Project Owner shall consume no more than 2,000 AF of MRB Water Rights in water year 2015/2016 (October 1, 2015 – September 30, 2016) and no more than 2,000 AF in water year 2016/2017 (October 1, 2016 – September 30, 2017). The acquisition, use and transfer of MRB Water Rights shall comply with the Judgment and Rules and Regulations of the Watermaster.~~

At the project owner's discretion, dry cooling may be used instead, if an amendment to the Commission's decision allowing dry cooling is approved.

c. **The Project Owner shall operate the project to maintain the required cooling tower blowdown rate (CT Blowdown Rate) based on the CT Blowdown Formula and to maintain chloride concentration at or below 980 mg/L (Threshold Chloride Concentration) in the circulating cooling tower water. The project owner shall coordinate with the City of Victorville to install equipment necessary to minimize chlorine concentration in recycled water and optimize use at low flows when the project is operating in lower load modes. Equipment necessary to manage chlorine injection shall be installed and operating within one year of the date of the Commission Decision.**

When the required CT Blowdown Rate is less than the actual blowdown rate as determined by the CT Blowdown Formula, or when the chloride concentration cannot be maintained at or below the Threshold Chloride Concentration, the Project Owner shall implement a "Loading Sequence" as described:

First, HDPP will continue to maximize use of Recycled Water as the Facility's primary water supply, to the extent it is available and its quality is sufficient to maintain cooling tower functions and reliable operation of the Facility, blended with SWP Water, if available and of suitable quality, in ratios that allow the required CT Blowdown Rate to be achieved and the chloride concentration to remain below the Threshold Chloride Concentration.

Second, if monitoring indicates that higher quality backup water is needed to achieve the required CT Blowdown Rate or to reduce chloride concentration to below the Threshold Chloride Concentration, the Facility may next blend in Banked (injected or percolated) SWP Water, if available, in ratios that allow the required CT Blowdown Rate to be achieved and the chloride concentration to remain below the Threshold Chloride Concentration while maximizing Recycled Water use.

Third, if monitoring indicates that higher quality backup water is needed to achieve the required CT Blowdown Rate or to reduce chloride concentration to below the Threshold Chloride Concentration, the Facility may next blend in any of the water supplies in ratios that allow the required CT Blowdown Rate to be achieved and the chloride concentration to remain below the Threshold Chloride Concentration while maximizing Recycled Water use.

Finally, use of any of the supplies or blending of supplies is allowed during startup, shutdown, upset conditions, disruptions in water supply, material changes in water supply quality, and other abnormal circumstances provided the 20 percent minimum recycled water use is complied with on an annual basis. Once the required CT Blowdown Rate has been achieved and the chloride concentration has dropped below the Threshold Chloride Concentration, recycled water will continue to be used in ratios that maximize its use.

~~b~~ **d.** The project owner shall report, on or before the 15th of each month, the use of water from all sources for the prior month to the ~~Energy Commission~~ CPM in acre-feet. The monthly report shall include acre-feet usage by source, as well as total. **Specific recycled water events of unavailability or quality issues will also be included with daily detail.**

~~c~~ **e.** The project's water supply facilities shall be appropriately sized and utilized to meet project needs. The project shall make maximum use of recycled waste water for power plant cooling given current equipment capabilities and permit conditions.

VERIFICATION: ~~The project owner shall provide final design drawings of the project's water supply facilities to the CPM, for review and approval, thirty (30) days before~~

~~commencing project construction. The project owner shall submit to the CPM documentation showing the agreements entered into between the project owner, MWA Watermaster, and water right owners in MRB regarding the acquisition, use and transfer of MRB Water Rights.~~ The project owner shall report all use of water **and recycled water unavailability** in acre feet to the ~~Energy Commission~~ CPM **and CDFW** on a monthly basis for each supply: Recycled Water, SWP Water, **and** Banked SWP Water **(injected and percolated), and MRB Water Rights**. The monthly report shall contain a brief statement on ~~(1)~~ the water quantity and water quality of the supplies available in the prior month **and data demonstrating compliance with the loading sequence outlined in item c above. The monthly report shall also include the status of coordination with the City of Victorville to install equipment necessary to minimize chlorine concentration in recycled water, in accordane with item c above.** ~~and (2) a summary of efforts to use available supplies to provide cooling water for operations, build the HDPP groundwater bank, and/or preserve the HDPP water bank.~~

SOIL&WATER-4 ~~Injection~~ Banking Schedule

~~a. The project owner shall inject one thousand (1000) acre-feet of SWP water within twelve (12) months of the commencement of the projects commercial operation.~~

~~b. By the end of the four years and two months from the start of commercial operation, the project owner shall install and begin operation of a pre-injection ultraviolet (UV) disinfection system.~~

~~c. By the end of the fifth year of commercial operation, the project shall submit a report to the CPM demonstrating that HDPP has maintained an average THM concentration level consistent with the WDR permit requirements.~~

a. ~~After the end of the fifth year of commercial operation, t~~**The** project owner ~~shall~~ **may** inject SWP water when it is available in excess of volumes needed to operate the project, up to a cumulative quantity of 13,000 acre-feet, subject to equipment capabilities and permit requirements. The amount of **injected SWP** water available to HDPP for extraction is equal to Injection minus Extraction minus Dissipation minus 1000 acre-feet, as defined in SOIL&WATER-6.

b. The project owner may bank SWP water in the Mojave Groundwater Basin through percolation using existing Mojave Water Agency (MWA) facilities for the sole use at the HDPP facility subject to the terms of any necessary agreement(s) with MWA, the Mojave Basin Area Watermaster, the City of Victorville or the Victorville Water District. MWA shall be responsible for ensuring protection of water quality related to percolation.

VERIFICATION: ~~The project owner shall submit an installation and operation report describing the pre-injection ultraviolet disinfection system (UV) by the end of the fourth year of commercial operation~~. Forecasted estimates of SWP water to be injected shall be included in the quarterly Aquifer and Storage Recovery Well Report. ~~The project owner shall submit a UV performance report by the fifth year of commercial operation.~~ For other related items, see the verification to Condition 5. See also the verification to Condition 12. **The project owner shall provide to the CPM and to the California Department of Fish and Wildlife (CDFW) a copy of any agreement(s) with MWA, Mojave Basin Area Watermaster, City of Victorville or**

Victorville Water District regarding use of existing MWA facilities for the percolation and banking of SWP water for the facility.

SOIL&WATER-5 Calculation of Water Bank Balance

a. The amount of **injected,** banked groundwater available to the project shall be calculated by the ~~CEC~~ **CPM** using the **High Desert Power Project (**HDPP**)** model, FEMFLOW3D. The amount of **injected,** banked groundwater available shall be updated on a calendar year basis by the ~~CEC~~ **CPM** ~~staff~~, taking into account the amount of groundwater pumped by the project during the preceding year and the amount of water banked by the project during the preceding year.

b. When calculating the amount of **injected,** banked groundwater available to the project, ~~CEC~~ **the CPM** ~~staff~~ shall subtract any amount of water that is produced by ~~Victor Valley~~ **Victorville** Water District (~~V~~VWD) from the project wells for purposes other than use by the project that exceeds the baseline, as defined in SOIL&WATER-17(1).

c. Each annual model run shall simulate the actual sequence of historic pumping and injection since the injection program began. From the model runs, the ~~CEC~~ **CPM** ~~Staff~~ shall determine the amount of groundwater available for each new calendar year. If the amount of **injected,** banked groundwater ~~**available to the project**~~ is less than one (1) year's supply plus 1,000 acre-feet, the ~~CEC~~ **CPM**~~Staff~~ shall determine the amount of groundwater available to the project on a quarterly basis.

d. The amount of percolated, banked groundwater available to the project shall be calculated by MWA or the Mojave Basin Area Watermaster.

VERIFICATION: ~~During the period beginning eighteen (18) months after the start of rough grading and concluding at the end of the first month after one full year (12 months) of commercial operation, the project owner shall provide a monthly report to the CEC CPM and to the CDFG on the progress of construction of the project wells, and shall identify the amount of SWP water injected and the amount of groundwater pumped during the previous month. The CEC CPM shall provide notice that this material has been submitted to those identified on the project's compliance mailing list.~~

After the end of the first month after one full year (12 months) of commercial operation, the project owner shall submit to the ~~CEC~~ CPM and ~~to the~~ CDF~~G~~**W** in writing, on a quarterly basis, a monthly accounting of all groundwater pumped**,** ~~and~~ all SWP water treated and injected**, and all SWP water banked through percolation by MWA** in the preceding quarter. Within thirty (30) days of receipt of the approved annual storage agreement, pursuant to **SOIL&WATER-2**, the project owner shall submit to the ~~CEC~~ CPM and to the CDF~~G~~**W** an annual written estimate of the anticipated amount of SWP water that will be banked and the anticipated amount of groundwater that will be pumped in the coming year. If the amount of **injected,** banked groundwater available to the project is less than ~~one (~~1~~)~~ year's supply plus ~~one thousand (~~1,000~~)~~ acre-feet, quarterly estimates of anticipated injection and withdrawal will be required. ~~The CEC CPM shall provide notice that this material has been submitted to those identified on the project's compliance mailing list.~~

~~CEC~~ **The CPM** ~~Staff~~ shall use this information in the HDPP model to evaluate the amount of banked groundwater available and to calculate the approximate rate of decay **for the injection**

bank. ~~CEC~~ **The CPM** ~~Staff s~~hall notify the project owner within ~~thirty (~~30~~)~~ days of the amount of banked groundwater available to be pumped in the new calendar year or in the next quarter, if applicable.

SOIL&WATER-6 Banked Water Available for Project Use

~~a. The amount of banked groundwater available to the project during the first twelve (12) months of commercial operation is the amount of SWP water injected by the project owner into the High Desert Power Project (project) wells, minus the amount of groundwater pumped by the project owner, minus the amount of dissipated groundwater, and minus any amount described in SOIL&WATER-5(b).~~

a.~~b.~~ The amount of banked groundwater available to the project after the first ~~twelve (~~12~~)~~ months of commercial operation is**: (1) the amount of SWP water percolated in accordance with SOIL&WATER-4(b**e**); and (2)** the amount of SWP water injected by the project owner into the project wells**,** minus the amount of groundwater pumped by the project owner, minus the amount of dissipated groundwater, minus ~~one thousand (~~1,000~~)~~ acre feet, and minus any amount described in SOIL&WATER-5(b).

b.~~c.~~ During the three (3) years prior to project closure, the project owner may withdraw the balance of banked groundwater determined to be available to the project, except ~~for one thousand (~~1,000~~)~~ acre-feet, pursuant to SOIL&WATER-5. The project owner is not required to replace this final withdrawal of groundwater. However, during the three (3) years prior to project closure, at no time may the balance of banked groundwater decline below ~~one thousand (~~1,000~~)~~ acre-feet. Furthermore, there must be a remaining balance of ~~one thousand (~~1,000~~)~~ acre-feet banked in the groundwater system at closure, as determined to be available to the project pursuant to SOIL&WATER-5. This balance of ~~one thousand (~~1,000~~)~~ acre-feet must remain in the groundwater system, and the project owner, by contract or other conveyance, may not transfer the rights to this balance.

c. The project shall not operate for longer than thirty (30) years unless the Commission has approved an amendment to its license that specifically evaluates the water resources impacts of continued operation and imposes any mitigation necessary to ameliorate any identified impacts.

~~**d.**c. No water is available for project use if the requirements of SOIL&WATER-4 are not met by the project owner.~~

VERIFICATION: The project owner shall use the same verification as for **SOIL&WATER-5**; however, in addition, any facility closure plan submitted during that last three (3) years of commercial operation shall address the disposition of any remaining water available to the project, as well as the disposition of the water treatment facility.

SOIL&WATER-13

The project owner shall implement the approved water treatment and monitoring plan. All ~~banked~~ **injected** SWP water shall be treated to meet local groundwater conditions as identified in Condition SOIL&WATER-12. Treatment levels may be revised by the ~~CEC~~ **CPM** and, if applicable, by the **Regional Water Quality Control Board (**RWQCB**)**, based upon changes in

local groundwater quality identified in the monitoring program not attributable to the groundwater banking program. Monitoring results shall be submitted annually to the ~~CEC~~ CPM and, if applicable, to the RWQCB.

VERIFICATION: The project owner shall annually submit monitoring results as specified in the approved plan to the ~~CEC~~ CPM. The project owner shall identify any proposed changes to SWP water treatment levels for review and approval by the ~~CEC~~ **Energy Commission** and, if appropriate, the Lahontan RWQCB. The project owner shall notify the RWQCB, the VVWD, and the ~~CEC~~ CPM of the injection of any inadequately treated SWP water into the aquifer due to an upset in the treatment process or for other reasons. Monitoring results shall be submitted to the ~~CEC~~ CPM**.**

~~**SOIL & WATER 22.**~~

~~Until September 30, 2018, and notwithstanding the existing Soil & Water Conditions of Certification, the project owner may percolate SWP water consistent with an agreement with MWA (or modification to any existing agreement regarding SWP water banking), provided that the amount of percolated water that will be available to withdraw for power plant cooling shall be calculated in the same manner as for injected SWP water pursuant to Conditions of Certification Soil & Water 4, 5, and 6.~~

~~**VERIFICATION**: If the project owner and MWA are able to reach an agreement or modify existing agreements regarding use of existing MWA facilities for the percolation of SWP water, the project owner shall provide a copy of such agreement or modified agreements, and any subsequent modifications to the CPM, within 10 days of their finalization.~~