Russell City Energy Center

(01-AFC-7C)

Petition for Modification
Amendment No. 6

Submitted by

Russell City Energy Company, LLC

January 2016

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Executive Summary

Russell City Energy Company, LLC, as project owner, petitions the California Energy Commission (CEC or Commission) to modify the certification for the Russell City Energy Center (RCEC) (01-AFC-7, issued September 11, 2002 and amended October 3, 2007), hereinafter "Decision." This petition (Petition) requests a Staff approved modification in order to install a demineralized water system for RCEC. The uses of demineralized water will remain the same. The source of water to be demineralized will come directly from the Title 22 recycled water generated at the RWF rather than from ZLD distillate, the source of which is primarily Title 22 recycled water collected as cooling tower blowdown.

Section 1.0 provides an overview of the Petition. Section 2.0 sets forth and describes the proposed installation of the demineralized water system and addresses the necessity of the changes and the consistency of the changes with the Decision. Section 3.0 assesses the potential environmental effects of the proposed changes, the project's continued compliance with all laws, ordinances, regulations and standards, and the consistency of the changes with the Commission Decision certifying the facility. This assessment indicates that adoption of the Petition will not result in any significant, unmitigated adverse environmental impacts. The RCEC will continue to comply with all applicable laws, ordinances, regulations and standards. The findings and conclusions contained in the Commission Decision of October 3, 2007 amending certification of the RCEC are still applicable to the RCEC.

1.0 Introduction

1.1 Overview

Russell City Energy Company, LLC, ("project owner") petitions the Commission for a staff approved modification to the certification for the Russell City Energy Center ("RCEC" or "plant") in order to install a demineralized water system.

The RCEC is an approximately 600 megawatt natural gas-fired, combined cycle electric generating facility located in the City of Hayward in Alameda County. This project was certified by the California Energy Commission ("CEC" or "Commission") in September 2002,[1] and received an amended approval in October 2007,[2] hereinafter "Decision."

This Petition contains all of the information that is required pursuant to the Siting Regulations (California Code of Regulations [CCR] Title 20, Section 1769, Post Certification Amendments and Changes). The information necessary to fulfill the requirements of Section 1769 is contained in Sections 1.0 through 5.0 as summarized in Table 1 below.

TABLE 1
Informational Requirements for Post-Certification Amendments and Changes

Section 1769 Requirement	Section of Petition Fulfilling Requirement
(A) A complete description of the proposed modifications, including new language for any conditions that will be affected	No modification of conditions is required
(B) A discussion of the necessity for the proposed modifications	Section 2.2
(C) If the modification is based on information that was known by the petitioner during the certification proceeding, an explanation why the issue was not raised at that time	Section 2.2
(D) If the modification is based on new information that changes or undermines the assumptions, rationale, findings, or other bases of the final decision, an explanation of why the change should be permitted	Sections 3.2
(E) An analysis of the impacts the modification may have on the environment and proposed measures to mitigate any	Section 3.0

[1] California Energy Commission. 2002. Commission Decision, Russell City Energy Center, (01-AFC-7), Alameda County. California Energy Commission, Sacramento, California. September 11, 2002.

[2] California Energy Commission. 2007. Commission Decision, Russell City Energy Center, Petition for Amendment to Application for Certification (01-AFC-7C), Alameda County. California Energy Commission, Sacramento, California. October 3, 2007.

TABLE 1
Informational Requirements for Post-Certification Amendments and Changes

Section 1769 Requirement	Section of Petition Fulfilling Requirement
significant adverse impacts	
(F) A discussion of the impact of the modification on the facility's ability to comply with applicable laws, ordinances, regulations, and standards;	Section 3.3
(G) A discussion of how the modification affects the public	Section 4.0
(H) A list of property owners potentially affected by the modification	No property owners are potentially affected
(I) A discussion of the potential effect on nearby property owners, the public and the parties in the application proceedings.	Section 5.2

1.2 Summary of Environmental Impacts

The Siting Regulations require that an analysis be conducted to address the potential impacts the proposed change may have on the environment and proposed measures to mitigate any potentially significant adverse impacts (Title 20, CCR, Section 1769 [a][1][E]). The regulations also require a discussion of the impact of the proposed change on the facility's ability to comply with applicable laws, ordinances, regulations and standards ("LORS") (Title 20, CCR Section 1769 [1][a][F]).

Section 3.0 of this Amendment includes a discussion of the potential environmental impacts associated with installation of the demineralized water system and a discussion of the consistency of the modification with LORS. Section 3.0 concludes that there would be no significant environmental impacts associated with implementing the actions specified in this Petition and that the project as modified would comply with all applicable LORS.

2.0 Description of Project Changes

This section includes a complete description of the proposed project changes consistent with the Siting Regulations (Title 20, CCR, Section 1769 [a][1][A]).

2.1 Installation of the Demineralized Water System

The RCEC as originally designed and constructed uses Zero Liquid Discharge (ZLD) system distillate as the primary source for production of demineralized water for steam cycle makeup and combustion turbine inlet air cooling.

The plant's Recycled Water Facility (RWF) removes suspended solids but does not remove organic contamination or ammonia present in the secondary effluent delivered to the RWF. These contaminants pass through the RWF, enter the cooling tower with the Title 22 water makeup, concentrate in the cooling tower, and then proceed to the ZLD system. Ammonia and many organics are volatile, so they form vapor in the ZLD brine concentrator and then condense in the ZLD distillate. Both of these contaminants can affect the reliability and operating cost of the plant. The ammonia results in rapid exhaustion of the mixed bed trailers used to treat ZLD distillate as per the original design. The volatile organics are weakly ionized, which means they are not removed by the ion exchange resin contained in the mixed bed trailers. Volatile organics pass through the mixed beds and enter the demineralized water. These organics break down to form organic acids at the elevated temperatures encountered in the steam cycle. Organic acid pH is low and cation conductivity is high. Low pH and high cation conductivity both increase the risk of steam cycle corrosion. Chemistry upsets caused by these contaminants have resulted in forced outages and additional forced outages will occur again if the plant continues to rely on the use of ZLD distillate for demineralized water production. Relying on ZLD distillate for demineralized water production also limits the plant's ability to produce demineralized water on demand. The ZLD system must be operating to produce demineralized water. Because of these problems, which are common to all plants that rely on ZLD distillate to produce demineralized water, the project owner has determined that it is necessary to discontinue use of ZLD distillate to produce demineralized water.

Before the RWF was completed, Title 22 recycled water was produced utilizing temporary UF filtration trailers permitted by the San Francisco Bay Regional Water Quality Control Board. The UF technology effectively removed the volatile organics during the August 8, 2013 to July 2014 period that the temporary UF filtration trailers were utilized. Operation of the RWF system commenced in July 2014, at which point the volatile organics in the secondary effluent began to pass through the RWF and into the ZLD distillate and causing forced outages due to steam system contamination.

In July 2014, the Project Owner in consultation with water treatment experts piloted a Reverse Osmosis (RO) system for treatment of the ZLD system distillate in an attempt to resolve the issue. Various configurations of the RO system were experimented with between July and December 2014 exhausting all RO options without success. These experiments concluded that treatment of ZLD distillate with reverse osmosis could not consistently remove the contaminants of concern.

In December 2014, Project Owner in conjunction with water treatment experts began designing a demineralized water treatment system utilizing Title 22 recycled water directly from the plant's RWF (instead of ZLD system distillate). This design is

similar to systems utilized at many plants in California including several Calpine plants.

2.1.1 Overview of New Demineralized Water System

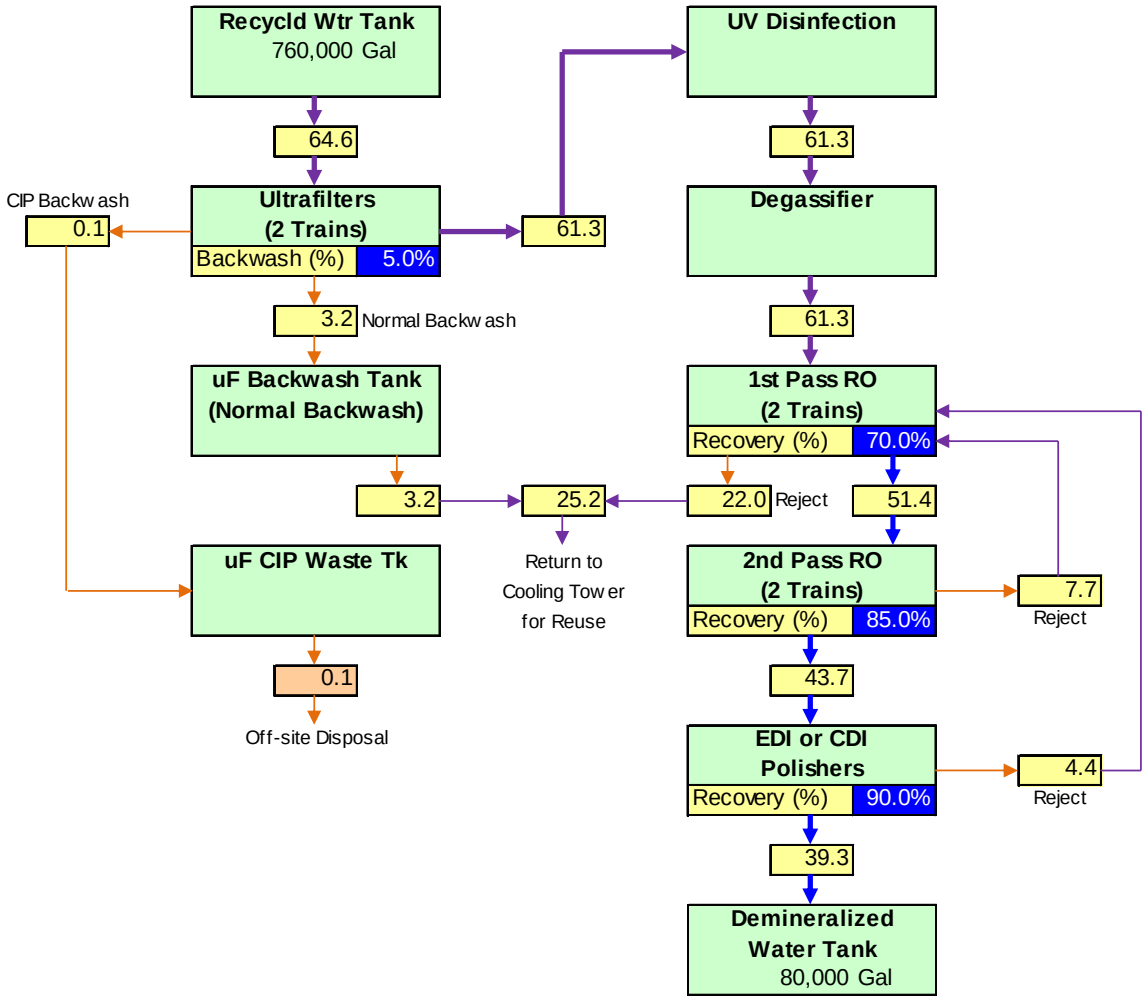
The new system design will utilize a series of Ultra Filtration membrane technology, Ultra-violet disinfection, Reverse Osmosis and ion exchange technology proven at other Calpine facilities to produce demineralized water directly from Title 22 recycled water.

Recycled water will first pass through self-backwashing strainers and then proceed to two ultrafiltration units. Filtered effluent will then pass through a disinfection step utilizing ultraviolet light. Filtered, disinfected water will then proceed through a degassifier for removal of carbon dioxide. Degassifier effluent will feed the first pass RO units. First pass RO permeate will feed the second pass RO units, and second pass RO permeate will feed the electro-deionization (EDI) or continuous de-ionization (CDI) units. EDI or CDI permeate will then be sent to the demineralized water storage tank.

Normal backwash waste from the ultrafiltration units and reject flow from the first pass RO units will be sent to the cooling tower for reuse as makeup. These waters are less concentrated than normal cooling tower circulating water and so provide beneficial reuse as makeup.

Proposals have been received from two qualified suppliers and are currently being evaluated. Both proposals utilize the same process blocks and similar technology. A basic block diagram of the system appears in Figure 1.

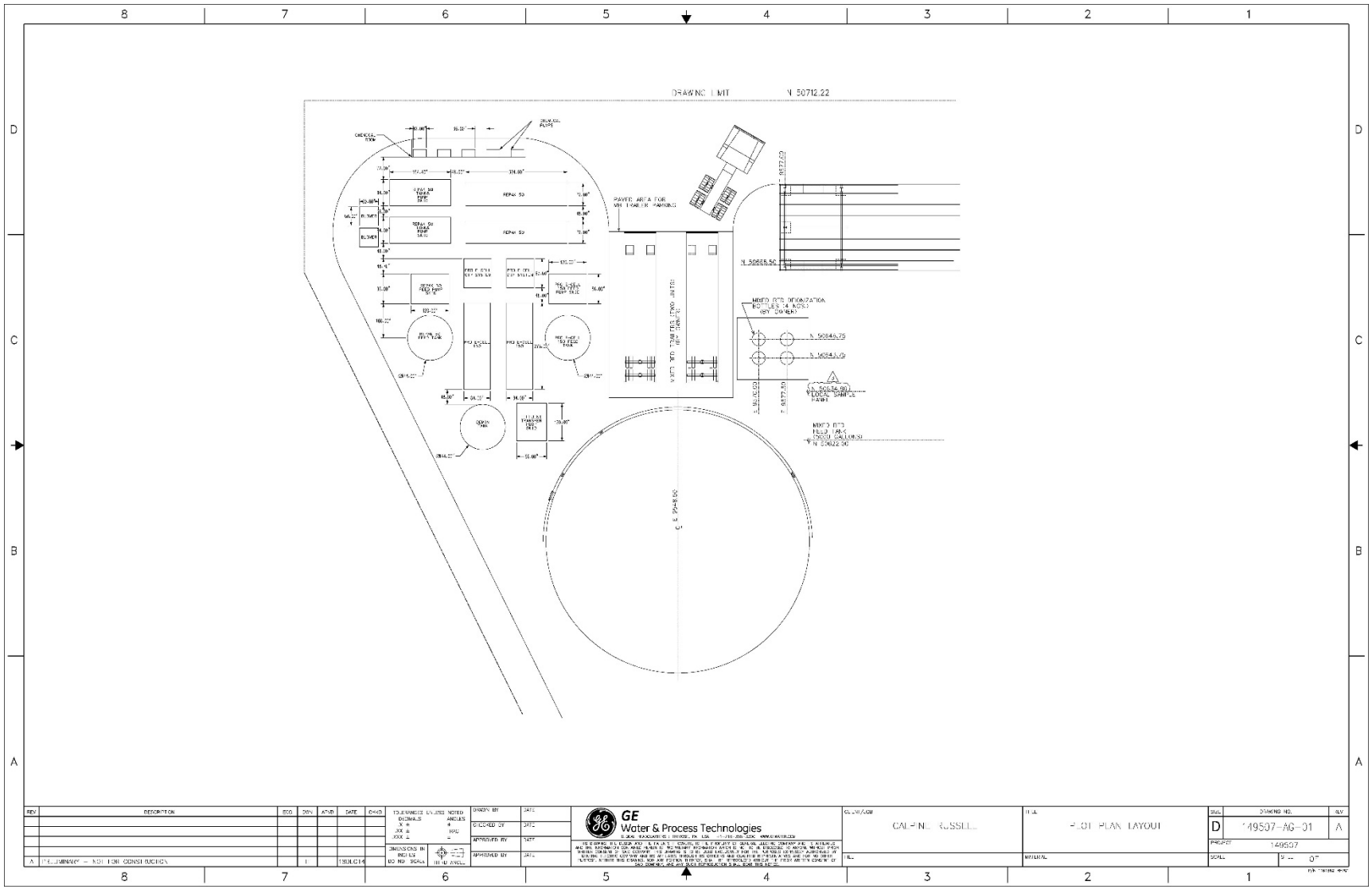
Figure 1: RCEC Demineralized Water Treatment System



2.1.3 System Will Be Located within the Fence Line and Will Be Visually Unobtrusive

A schematic of the system showing general layout and dimensions is provided in Figure 2. The system will be located within the fence line in the northwest corner of plant. The system will be placed on disturbed ground previously used for equipment staging and the temporary UF trailers. The tallest pieces of equipment, the UF Skids (Shown as Repak 50) and the Feed tanks, are approximately 10 feet tall and are lower than surrounding equipment at the plant. A canopy or enclosure covering the system will be included in the final design. The new equipment will not materially change the appearance of the plant from neighboring businesses and roadways.

Figure 2: General Layout and Typical Dimensions for RCEC Demineralized Water Treatment System



2.1.4 Minimal Construction is Required

Construction of the permanent demineralization system will require the installation of various skid-mounted equipment, interconnecting piping, electrical power, and electrical controls. Construction will consist of site preparation, installation of underground piping, installation of skid foundations, installation of the actual skids, installation of necessary power and control systems, and installation of above-ground interconnecting piping. The installation location has been previously developed and is part of the plant, so surface and subsurface work is expected to be minimal. No large tanks or other tall structures will be installed.

Construction is expected to occur over approximately 12-18 weeks. Construction will be performed by contract labor with supervision and assistance from plant personnel. Estimated vehicular traffic associated with delivery of the system equipment is seven to ten trucks over a two week period traveling via Depot Road. Estimated vehicular traffic associated with construction of the system is one to two trucks per day over a 6 week period. There will be no oversized loads required for any stage of this project.

Completion and startup of the new system is expected to be complete in mid to late 2016.

2.1.4 System Will Not Impact Plant Water Balance and Will Reduce Potable Water Use

The new system will have no net impact on the plant design water balance. Recycled water will be used directly to produce demineralized water. Wastewater produced by the demineralization system will be sent to the cooling tower. The demineralized water will be used for steam cycle makeup, combustion turbine inlet air cooling, combustion turbine washes, and closed cooling water makeup. Cooling tower blowdown (the majority of which is derived from recycled water produced by the RWF) will still be processed in the plant's ZLD system. All ZLD distillate will be used as cooling tower makeup and will off-set the additional recycled water used to produce demineralized water. This change will also minimize the use of potable water for emergency production of demineralized water.

2.2 Necessity of Proposed Changes

The Siting Regulations require a discussion of the necessity for the proposed revision to the RCEC project and whether the modification is based on information

known by the petitioner during the certification proceeding (Title 20, CCR, Sections 1769 [a][1][B], and [C]).

As described in Section 2.1 above, the need to install a demineralized water system was discovered after the plant began operation and was not known during the certification proceeding.

3.0 Environmental Analysis of Proposed Project Changes and Consistency with LORS

The installation of the demineralized water system is an activity that is categorically exempt from CEQA. Section 21084 of the Public Resources Code requires that the CEQA guidelines include a list of classes of projects which have been determined not to have a significant effect on the environment and which shall, therefore, be exempt from the provisions of CEQA. Guidelines section 15303 exempts construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure. The new system will consist of small skid-mounted equipment, interconnecting piping, electrical power, and electrical controls. Guideline section 15304 exempts minor alterations in land which do not involve removal of healthy, mature, scenic trees except for forestry or agricultural purposes. The only ground disturbance associated with the new facility entails the installation of skid foundations and underground water and electrical piping.

Notwithstanding that the installation of the demineralized water system is exempt from CEQA, the following discussion addresses the relation of the installation to the environment.

3.1 Changes resulting from construction of the demineralized water system.

This Petition requests authorization to install a demineralized water system. This action will not result in any significant adverse environmental impact.

3.1.1 Air Quality

The installation will not cause any change in air quality.

3.1.2 Biological Resources

The installation will not cause any adverse impacts to biological resources. The installation will occur inside the fence line of the existing plant where no biological resources are present.

3.1.3 Cultural Resources

The installation will not cause any adverse impacts to cultural resources. The construction will involve minimal ground disturbance inside the fence line of the existing project in previously disturbed ground, and will be limited to the placement of skid foundations and underground water and electrical piping.

3.1.4 Geology and Paleontology

The installation will not cause any adverse impacts to geology and paleontological resources. The i will occur inside the fence line of the existing project where no paleontological resources will be impacted. The minimal ground disturbance associated with the new facility will occur in previously disturbed ground.

3.1.5 Hazardous Materials Management

The installation will have no effect on hazardous materials management.

3.1.6 Land Use

The installation will have no effect on land use.

3.1.7 Noise and Vibration

The installation will have no effect on noise.

3.1.8 Public Health

The installation will have no effect on public health.

3.1.9 Socioeconomics

The installation will have no impact on socioeconomics.

3.1.10 Soil and Water Resources

The uses of demineralized water will remain the same. The source of water to be demineralized will come directly from the Title 22 recycled water generated at the RWF rather than from ZLD distillate, the source of which is primarily Title 22

recycled water collected as cooling tower blowdown. This change has no net impact on the plant design water balance. Recycled water will be used to directly produce demineralized water. Wastewater produced by the demineralization system will be sent to the cooling tower. The demineralized water will be used for steam cycle makeup, combustion turbine inlet air cooling, combustion turbine washes, and closed cooling water makeup. Cooling tower blowdown will still be processed in the plant's ZLD system. All ZLD distillate will be used as cooling tower makeup and will off-set the additional recycled water used to produce demineralized water. This change will also minimize the use of potable water for emergency production of demineralized water. Therefore, installation of the demineralized system will have no impact on soil and water resources.

3.1.11 Traffic and Transportation

The short term construction for the installation will have no traffic or transportation impacts. Estimated vehicular traffic associated with delivery of the system equipment is to seven to ten trucks over a two week period traveling via Depot Road. Estimated vehicular traffic associated with construction of the system is one to two trucks per day over a 6 week period. There will be no oversized loads required for any stage of this project.

3.1.12 Visual Resources

The tallest pieces of equipment, the UF Skids and the Feed tanks, are approximately 10 to 15 feet tall and are lower than surrounding equipment at the plant. The new equipment will not materially change the appearance of the plant from neighboring businesses and roadways.

3.1.13 Waste Management

The system will not change or impact waste management practices. Any materials removed during construction will be disposed of at appropriate waste management facilities.

3.1.14 Worker Safety and Fire Protection

The installation will not result in any negative impacts to worker safety. All work will be performed in accordance with the approved Construction Safety and Health Program and all applicable OSHA regulations.

3.2 Consistency of the Petition with the Certification and LORS

The Siting Regulations require a discussion of the consistency of the proposed project revisions with the applicable laws, ordinances, regulations, and standards (LORS) and whether the modifications are based upon new information that

changes or undermines the assumptions, rationale, findings, or other bases of the final decision (Title 14, CCR Section 1769 [a][1][D]). If the project is no longer consistent with the certification, the petition for project change must provide an explanation for why the modification should be permitted.

This Petition is consistent with all applicable LORS and is not based on new information that changes or undermines any bases for the Decision. The use of Title 22 recycled water to produce demineralized water is authorized by the Water Recycling Requirements issued to the RWF in San Francisco Bay Regional Water Quality Control Board Order R2-2013-0001. The findings and conclusions contained in the Decision for the project are still applicable to the project.

4.0 Potential Effects on the Public

This section discusses the potential effects on the public that may result from the modifications proposed in this request for approval, per the Siting Regulations (Title 20, CCR, Section 1769[a][1][G]).

The installation will have no effect on the public.

5.0 Potential Effects on Property Owners

5.1 Potential Effects on Property Owners

This section addresses potential effects of the project changes proposed in this Amendment on nearby property owners, the public, and parties in the application proceeding, per the Siting Regulations (Title 20, CCR, Section 1769 [a][1][I]).

As described in this Petition, there will be no significant adverse environmental impacts from the installation of the demineralized water system. Therefore, there will be no significant adverse effects on property owners.