May 14, 2015

To: Joseph Street
California Coastal Commission

Re: **San Onofre spent fuel pool cooling system and chiller waivers 9-15-0417-W and 9-15-0162-W**

I recommend the Coastal Commission deny this waiver and require a new Coastal Permit. Based on the responses from Edison that you and others provided and considerable research, I have no confidence these new cooling systems will be adequate and maintainable for the lifespan needed and for the functions needed.

Southern California Edison has provided inadequate answers to my questions and has not provided one single example of where a chiller system has been used for this application, let alone in our corrosive coastal environment.

This is too important an issue for a system that must function for decades, if not longer. Loss of coastal access and impact to the coastal area could be significant. Access to I-5 could even be denied, if this unproven system fails. Also, the only method to replace a failed spent fuel storage canister is to return it to the pools. Edison has provided no information as to the capacity of this system to do that. Since the San Onofre spent fuel will be at our coast for decades, if not longer, we need to err on the side of caution.

It has proven impossible to receive adequate answers from Edison, which has caused delays and wasted time. There is no urgency to Edison's request. In fact, the decommissioning proceeding at the CPUC will not be completed until sometime in 2016 and decommissioning will take decades.

The following pages you sent me contain the original questions to Edison and their inadequate answers. I've added my responses in [dark blue in brackets]. These are major concerns that still need to be addressed.

And the only mention of the chiller manufacturer's experience with nuclear cooling was at Wolf Creek in Topeka, Kansas. This was just a temporary short-term cooling of a small area. As you can see from this Trane description, it is not even close to what is being proposed for San Onofre's spent fuel pools.

> "The Trane Rental Services team suggested an 80-ton, air-cooled rental chiller (model RTAA) that could be secured for a two-year period. The rotary chiller is compact and designed to be reliable and efficient. A generator was also recommended to ensure the chiller operated safely and efficiently, regardless of Wolf Creek's power supply. All of the Trane equipment was housed in special structures to ensure complete containment if anything were to leak The Trane Rental Services team engineered and initiated a unique solution to answer Wolf Creek's immediate needs, all within the required timeframe. The rental chiller and generator ensure reliable, safe cooling of a portion of the nuclear plant's cooling water system."
>
> http://www.trane.com/commercial/north-america/us/en/about-us/newsroom/case-studies/rental-services/wolf-creek-nuclear-operating-corporation.html?resultNum=1

Unfortunately, the NRC does not plan to review or inspect the new cooling systems until AFTER installation, so we will not have information from them to help in this review of the areas where the Coastal Commission has jurisdiction.

Thank you,

Donna Gilmore, SanOnofreSafety.org
dgilmore@cox.net

Q&A about San Onofre Spent Fuel Pool Cooling Island Project

Below are links to the Trane Chillers Installation manual and a link to their brochures. No warranty information is included in these. Not sure which model Edison plans to use. These documents do not answer many key questions as you will see on these pages.

> http://www.trane.com/content/dam/Trane/Commercial/global/products-systems/equipment/chillers/air-cooled/RTAC-SVX01M-EN_01302015.pdf
>
> http://www.trane.com/commercial/north-america/us/en/products-systems/equipment/chillers/air-cooled-chillers/seriesr-rtac.html

EDISON ANSWERS AND MY NEW COMMENTS AND QUESTIONS IN [BLUE BRACKETS]

The spent fuel pool island cooling system is a method by which the spent fuel pool is isolated from its normal plant-installed support systems and is replaced by stand-alone cooling and filtration units. Spent fuel pool island cooling systems are simpler, smaller, localized to the spent fuel area and are tailored to shutdown conditions. In other words, the heat load for the current defueled condition is significantly lower than a full core offload condition when the offloaded fuel is at a much hotter and higher heat load condition. Therefore, the cooling island was designed to have a cooling capacity that is nearly twice the required cooling. This provides additional safety margin. Southern California Edison Company (SCE) has received a number of questions about this system and has provided the following information in response.

The questions were extracted from an e-mail from Donna Gilmore to Joe Street (California Coastal Commission) time stamped Monday March 9, 2015 3:25 PM

1Q: If this new spent fuel pool island system fails, what is the backup plan if Edison is allowed to destroy the current cooling system infrastructure? [no backup plan in your answer]

> **A:** This application filed with the CCC addresses the *addition* of an alternate cooling system to cool the Spent Fuel Pools (SFP) only. The proposed cooling system will reduce the number of components needed as compared to the current system, which was designed to cool components throughout an operating plant. The alternate cooling system will remain in service until all fuel is removed from the Spent Fuel Pools. The existing cooling systems will be decommissioned in the future in accordance with NRC regulations governing plant decommissioning. The new systems have additional capacity with cross tie capability and other features to address the failure of any components. This application request is for the addition of the new equipment only.

2Q: What is the maintenance on this system? [not provided by your answer]

> **A:** As is common with nuclear plant cooling systems, SCE would continually monitor (24 hours a day / 7 days a week) system parameters similar to the existing cooling system. Inspection and maintenance procedures are being developed and implemented prior to placing the system in service. These procedures are being developed using manufacturer recommendations for the major components (i.e., chillers, pumps, heat exchangers).

3Q: Is it experimental? I have not been able to find details about the technology. [answer does not address the question – where specifically are chiller systems being used to cool spent fuel pools with hot fuel? Just because this equipment is used in other applications does not demonstrate it is not experimental in this application.]

> **A**: No, this technology is not experimental. It is a simple water cooling system that is commonly used in energy and industrial applications. The proposed system consists of a commercially available chilled water system along with pumps and heat exchangers that are similar to the existing system. The

concept of a Spent Fuel Pool cooling island has also been used at other plants in decommissioning, including Big Rock Point, Trojan, Connecticut Yankee, Millstone 1, Maine Yankee, Yankee Rowe and Zion.

4Q: Where has this specific system been used before? [Did not answer the question about where this type of chiller system has been used]

A: As SCE noted in response to a question at a May 22, 2014 Community Engagement Panel meeting, which is publicly available online (www.songscommunity.com), an alternate spent fuel pool cooling system such as islanding has been used at half the decommissioned commercial nuclear plants in the U.S., including Big Rock Point, Trojan, Connecticut Yankee, Millstone 1, Maine Yankee, Yankee Rowe and Zion.

5Q: What is the source of the water? How will this impact our local water supply? [Given the new water requirements by Governor Brown's executive order, how does this comply with that or does it? What city is supplying the water? Have they been notified of the increase need for 900 gallons per week of city water?]

A: The proposed Spent Fuel Pool Island cooling system is composed of two (2) separate water loops. The secondary loop will continuously circulate fresh water through the chillers to the secondary side of the new Spent Fuel Pool Heat Exchanger and back through the chiller (Figure 2). It requires an initial system fill of **approximately 1000 gallons, which will come from the city supplied service water system**. In contrast, the **existing secondary cooling system is a once through system passing approximately 16,000 gallons per minute of ocean water**. The proposed Spent Fuel Pool Island cooling system is essentially a 'closed' system in that it does not require a continuous supply of once-through cooling water; however, **it does require makeup** as described below.

The primary loop will continue to operate in the same manner as it does now. Water from the Spent Fuel Pool is circulated through the primary side of the new Spent Fuel Pool Heat Exchanger and is returned to the pool. This loop is **currently** subject to **evaporative losses of approximately 900 gallons per week [city water vs. ocean water]** and **will not change** with the new Spent Fuel Pool Island cooling system. The source of that makeup water will continue to be our demineralized water system, which ultimately gets water from the city supplied service water system. Makeup needs will continue to decrease as the fuel continues to cool.

6Q: Where are the technical specifications?

A: The project uses **commercially** available equipment that is designed and fabricated by qualified commercial vendors**. The chillers, for example, are provided by Trane, the pumps are provided by Gould Pumps, and the heat exchanger by Alfa Laval (See Enclosure 1).**

7Q: Are we sure the system won't leak and how soon may it leak? What will the impact be on the coastal site if it leaks? [How frequently are periodic inspections? What is the mean time between failure rate? How long does the vendor or manufacturer guarantee this system will last in our corrosive marine environment? I read the entire Installation, Operation and Maintenance manual and it does not address this issue. Where is the warranty? My concern is this is not a robust system and is not commonly used (or used at all) for this environment and function. I have not seen any specific data from Edison to address these concerns.]

A: The cooling system has been designed and fabricated to high quality American Society of Mechanical Engineers (ASME) standards to help preclude system leakage. The system is composed of a primary and secondary loop. The primary loop, located entirely within the Spent Fuel Building, will circulate the radioactive Spent Fuel Pool water to the interfacing heat exchanger. The secondary loop will circulate water from the chiller unit located outside to the interfacing heat exchanger. Any leakage of the primary system would be within the Spent Fuel Building and would be captured and treated in the same manner as the existing system. Any leakage of the secondary system would be identified as part of **periodic** inspections in accordance with system operating requirements and procedures and resolved in the same manner as with the existing Component Cooling and Turbine Cooling Water systems.

8Q: What are the chemicals used in the pool and to clean the chillers? Will they be flushed into the ocean?

A: The Spent Fuel Pool contains Boron, which will continue to be maintained in accordance with the existing Plant Technical Specification requirements. The borated water is circulated in the primary cooling loop only (as described above). Although not anticipated, in the event that the chiller coils require cleaning, they would be cleaned using processes similar to existing Air Conditioner Maintenance. Station practices require covering any impacted storm drains in the vicinity of the work being performed so that no liquid enters the storm drain system. Cleaning water will not be flushed into the ocean.

9Q: How thick and what type is the stainless steel piping? What mechanisms and chemicals will be present that can degrade the steel pipe? [304 and the other stainless steel listed here are not rated for marine environments and are subject to stress corrosion cracking and other corrosion]. How and when will you inspect for microscopic cracks or will you allow leaks to go undetected for a period of time?]

A: This system uses components and piping constructed of American Society for Testing and Materials (ASTM) **A240 Type 304 and A312 Type 304 stainless steel**. The piping is a low pressure system utilizing Schedule 10 pipe, approximately **one eighth (1/8) of an inch thick**. Stainless steel components are used throughout the nuclear plant because of their resistance to nuclear power plant environments. The primary system will be exposed to borated water as is the existing spent fuel cooling system, and the secondary system will be exposed to water with a rust inhibitor (NALCO brand) that is similar to the existing component cooling and turbine cooling water systems at SONGS and many other plants. The secondary system exterior will also be exposed to the ocean atmosphere and will be periodically inspected for any signs of accumulating chlorides as performed on existing stainless steel piping systems.

10Q: What is the plan to detect and deal with potential leaks? I know our coastal grounds are full of corrosive chemicals and the soil is moist all the time. Some chillers use chloride for cleaning, which is corrosive to steel and can cause it to crack in a few short years.

A: The proposed spent fuel pool island system does not have any buried piping; all piping is above ground or within a building. A **combination of instrumentation and visual monitoring** will be used to identify and address any leaks in this system. If a leak is detected, the system would be taken out of service to make any repairs. Note, the modular design of the system allows for quick repair and replacement of components. Presently the system could go ~5 days with no cooling without exceeding two hundred (200) degrees Fahrenheit. Repair activities would be a day or less to complete. Although not anticipated, in the event that the chiller coils require cleaning, they would be cleaned using processes similar to existing Air Conditioner Maintenance.

11Q: Different chemicals are used in these pools and the chillers need to cool extremely hot water and maintain it below a certain temperature. Where are the details on this? This is different than chillers used in aquariums, so how can we trust this? Where's the data to support this system performance and reliability? [does not say they have been used for cooling spent fuel pools. Has yet

to provide a name of even one facility] [If due to power loss or other breakdown, the cooling will require higher demand – can the unit handle this – that was not answered]

A: The **Spent Fuel Pool temperatures are approximately 70^{o}F**. It should be noted that the temperatures are not extremely high. The fuel has a high heat load, this does not directly relate to high temperatures. The systems, as described above, are robust and utilize commercially available components with a history of use. These systems have been used worldwide and for more than 20 years throughout the United States, as noted above.

12Q: This system needs to be there for an indefinite period of time. If there is a problem in one of the thin spent fuel storage stainless steel canisters (e.g., through wall cracks), the pools are the only method to reload the fuel into another canister. There are no dry storage transfer systems in the entire country that are large enough to reload fuel into another canister. I know Edison wants to eliminate the pools, but until we are assured of a plan to deal with a failed canister, they should not be given a permit to do that. [Did not answer the question of how they would address a failed canister or if this system can handle that situation. This could result in closure of the beach area. Also, would I-5 also need to be closed? State parks, other beach access?]

A: As described above, this application with the California Coastal Commission addresses the installation of a new Spent Fuel Pool Island cooling system to cool the Spent Fuel Pools. The issue of Long Term Spent Fuel Storage including Time Limited Aging Analyses is being addressed in the Licensing of Spent Fuel Canisters by the NRC. The existing Spent Fuel Pools and cooling systems will be decommissioned in the future in accordance with the overall Decommissioning Plan described in the PSDAR.

13Q: How is this a closed-loop system? The pools are in a building that is subject to evaporation.

A: See Question 5.

14Q: What are the system redundancies? What are the single points of failure? [This is inadequate redundancy.] [For example: No current redundancy of chillers. What is the guaranteed delivery time of a replacement chiller?]

A: The primary loop includes two (100% redundant) pumps with a **single heat exchanger**. A spare heat exchanger will be onsite and available if replacement is needed. The secondary loop includes two (100% redundant) pumps with two chillers per unit. **The current heat load of the Spent Fuel Pools requires a total of three chiller units, which will decrease to two chillers total in approximately a year for the two Spent Fuel Pools.** Four chillers will be installed onsite and the chiller units can be cross tied. A review of failure modes was conducted to determine a set of replacement parts to be on hand and/or available from the vendor on short notice.

15Q: Would any of the design change if the location of the independent spent fuel installation changes? [What if a canister failed and needed to be returned to the pool? This is not addressed.]

A: No, the design of the Spent Fuel Pool Island cooling system is not dependent on the location of the Independent Spent Fuel Storage Installation (ISFSI).

16Q: What is the seismic rating of this system? [That is not the seismic standard used for nuclear grade equipment, so is not an adequate answer. Also, does it address the new seismic information regarding faults that can jump 9 feet to another fault?]

A: This equipment is structurally designed to meet the California Building Code.

Q&A about San Onofre Spent Fuel Pool Cooling Island Project

17Q: What are the warning systems in case of failure or water loss in the pool? [Does this require employee access the spent fuel pool to see water levels? What is the mitigation plan if water loss occurs and the new chiller system fails, in spite of attempts to repair it? Do you have a backup plan for this?] Are the alarms in an area where employees are always present? Will this still be the case for the duration of the spent fuel pools or are there plans to discontinue the computer operation center?]

A: The existing Spent Fuel Pool system has water level instrumentation and alarms. The proposed system will also include pressure, temperature, and flow instrumentation to alert operating personnel to any cooling system condition changes. These systems are, and will continue to be, monitored 24 hours a day / 7 days a week.

SUPPLEMENTAL QUESTIONS

The following four questions were extracted from commentary on e-mail from Joe Street (California Coastal Commission) to Kim Anthony, time stamped Tuesday, March 10. 2015 2:02 PM:

Sup Q1: How can SCE claim this is a closed system when they have a large amount space over the pools with industrial strength cranes on the side and above the pools?

A: See Question 5 above. The term ‘closed’ refers to the type of cooling system design.

Sup Q2: I would advise the California Coastal Commission request the maintenance documentation requirements/manual for the chillers. Often these systems use harsh chemicals and have hazardous waste to manage. I would think the California Coastal Commission would want to know what chemicals and what waste is produced by the chillers and what is the plan for disposal.

A: See Question 8 and ‘Supplemental Question’ 5 below.

Sup Q3: I would also advise the California Coastal Commission question how wise it is for all the chiller area storm drains to be plugged in this volatile environment.

A: SCE will require temporary barriers on storm drains to preclude debris from entering the system during implementation of work. This is common to all construction projects.

Sup Q4: I know it is not the role of the California Coastal Commission, but I have to ask if the NRC has given serious thought to plugging the drainage around electrical devices required to keep the spent nuclear fuel cool? Does the NRC even know SCE is planning on plugging these drainage systems? Did SCE provide this same project info to the NRC? Have you asked the NRC? It would not be the first time the NRC missed something vital at San Onofre.

A: See Supplemental Question 3 above, SCE has no plans to plug any drains as part of installing this Spent Fuel Pool Cooling System.

The following question/request was extracted from e-mail from Joe Street (California Coastal Commission) to Kim Anthony time stamped Monday, March 9, 2015 4:22 PM

Sup Q5: Below is a list of items that would be important additions to the file for this waiver:

1. **The make and model of the chillers proposed for use in the system, and their technical specifications. [Make, but not model numbers are on the Enclosure]**

   A: Specifications of the chillers including make and model are provided in Enclosure 1.

2. **Plans/diagrams of the chillers and of the full SFPI system once installed.**

   A diagram of the proposed Spent Fuel Pool Island cooling system consisting of two cooling loops is presented as Figure 2. A composite rendering of the proposed equipment superimposed on an existing plant photo is provided in Figure 3.

3. **A description of the maintenance activities that will be carried out over the life of the system.**

   A: A description of maintenance activities is provided in Enclosure 2

4. **Information on the ability of the system to withstand an earthquake or tsunami (e.g., description of the "seismic design" that you mentioned in previous conversations). [see previous comment about seismic concerns. [see 16Q. Also, what if access by an employee is not possible due to traffic, earthquake damage, etc? Recommend the Coastal Commission verify the current Tsunami risk height for this system. "Mean lower low water level" does not appear to be a sufficient measure.]**

   A: Since no irradiated fuel has been added to the Spent Fuel Pools in over three years**, the time it takes the Spent Fuel Pool water to reach 200 degrees Fahrenheit without any cooling has been increased from minutes to more than five days. The equipment and piping systems will be supported in accordance with the California Building Code; however, operability of the equipment post-major earthquake could require repair or restoration. In the event of a major earthquake resulting in substantial damage to the system, additional components will be available to repair the system. Also several methods of maintaining water level are in place. All of the new Spent Fuel Pool Island cooling system equipment is located at an elevation greater than thirty-one (31) feet above sea level (mean lower low water level,mllw) and the postulated tsunami height is 27 feet above sea level.**

NEW QUESTION – Donna Gilmore

Research shows chillers are a major noise factor. With four of them, this will even be louder. Have the Coastal Commission and Edison evaluated this factor?

Figure 1:

SONGS Ocean Cooling Systems

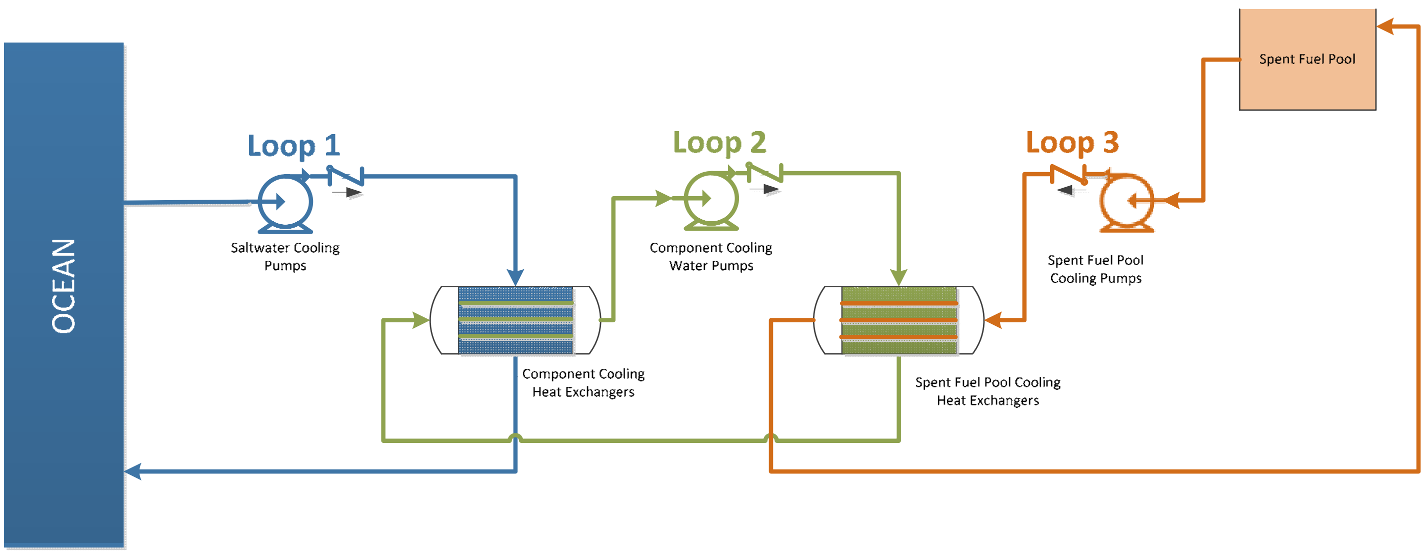


Figure 2:

SONGS Independent Spent Fuel Cooling Island

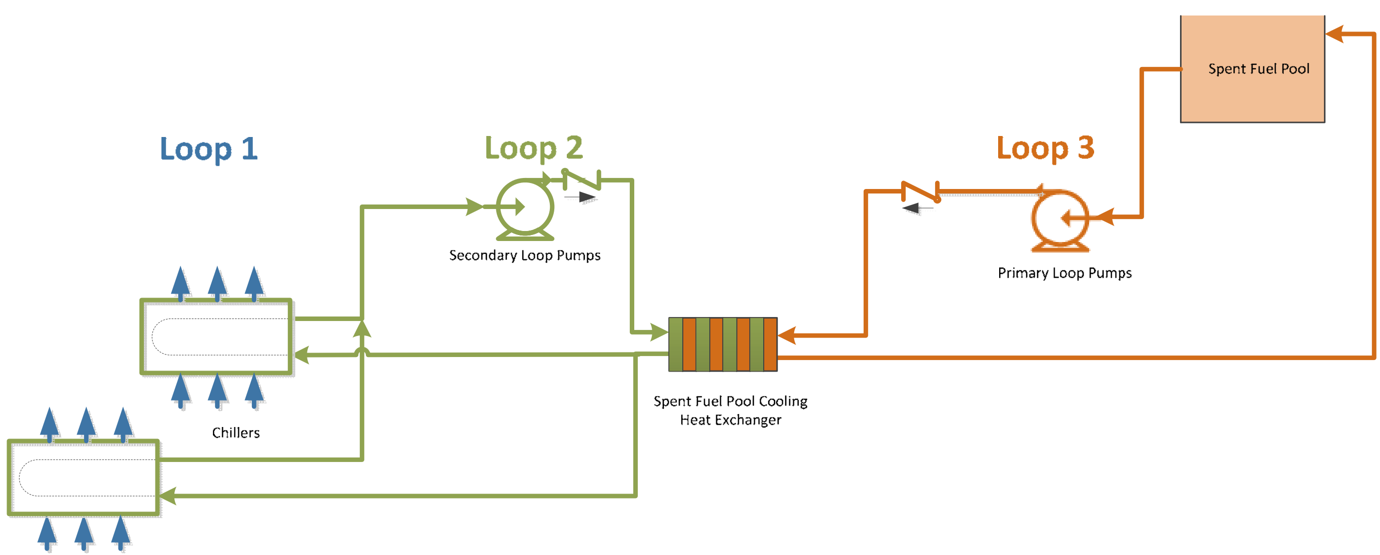


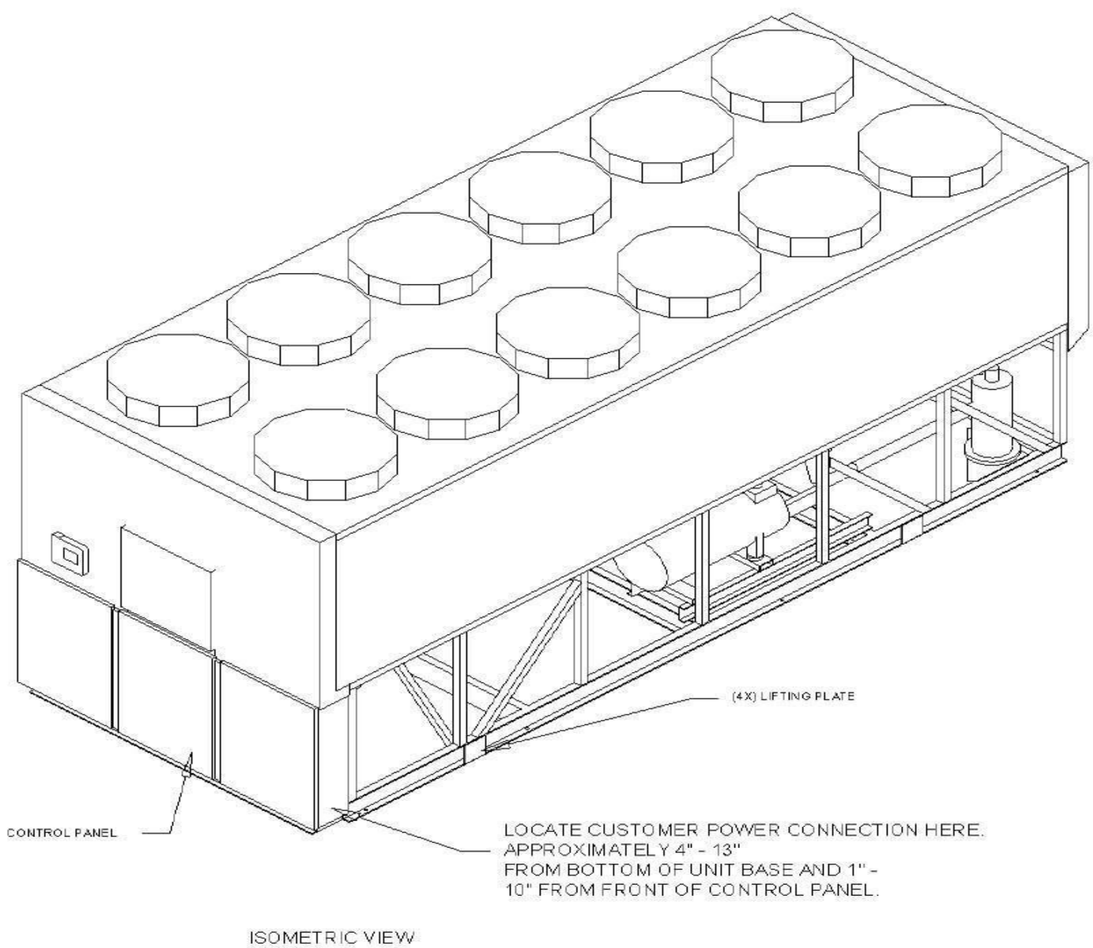
Figure 3 (rendering):

Proposed Chillers and
Pump & Power Enclosures

Enclosure 1

Equipment Description Trane 200 Ton Chiller Unit

Two 200-ton capacity air cooled chillers will be used within a closed loop cooling system utilizing potable water on the secondary side of the temporary fuel pool cooling system for SONGS Unit 2 and SONGS Unit 3. The designed criterion is based on information provided by SONGS of a heat load calculation of three million BTU/hr per fuel pool. Each chiller will be a 200-ton unit designed to remove 2.4 MBTU/hr and have the ability to be cross connected so the entire heat load of Units 2 and 3 spent fuel pools can be removed by three chillers. This will give SONGS the needed contingency in case of equipment shutdown due to the unlikelyhood of equipment failure or scheduled maintenance. The cooling water will leave the chillers and flow through a plate frame heat exchanger that will pull heat from the primary loop and return back to the chillers. Chillers will require 460 VAC power. **The chillers will be limited to a return temperature of 100^{o}F due** to relief valves on the refrigerant side of the unit, which will lift at 108^{o}F and **release Freon into the atmosphere.**



Enclosure 1

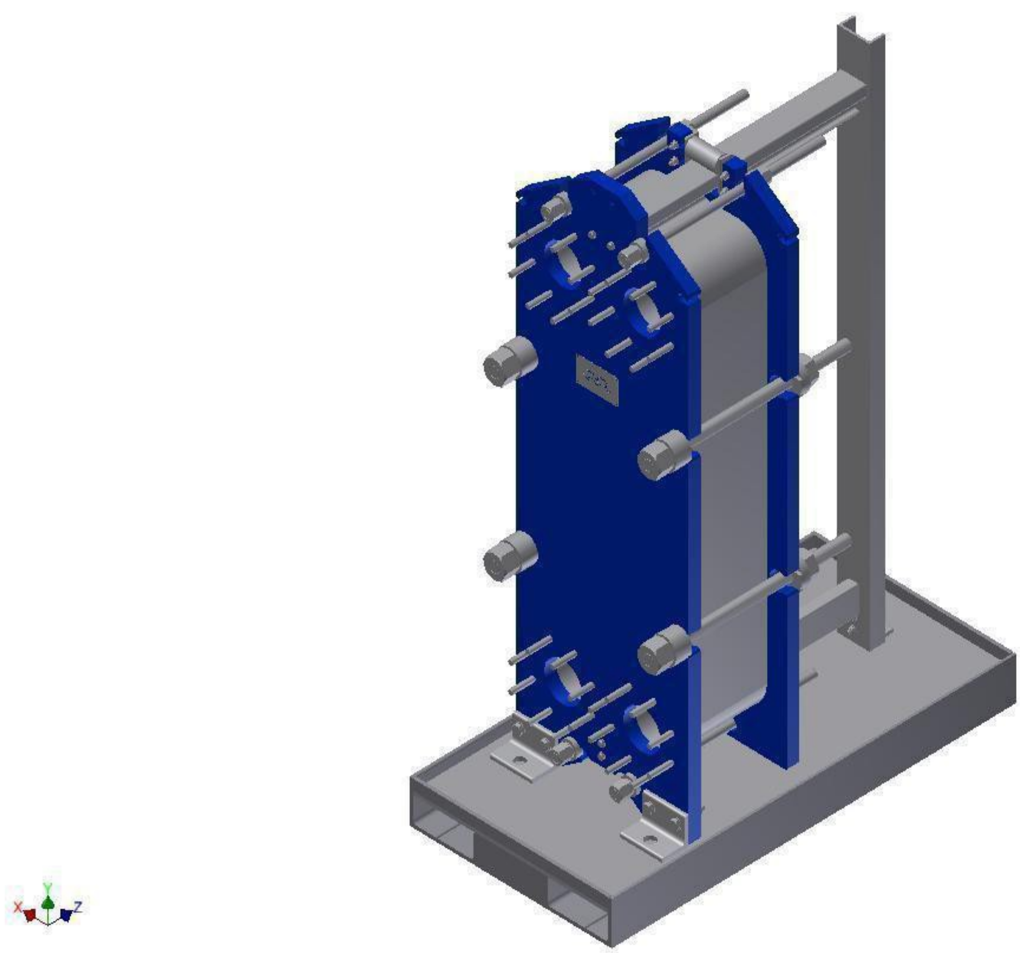
Manufacturer Performance Data

Rated capacity (AHRI)	198.90 tons	Rated efficiency (AHRI)	9.7 EER Evap application Std temp
ASHRAE 90.1/CSA compliance All versions IPLV	13.6 EER		
Refrig (HFC-134a) - ckt 1	215.0 lb.	Refrig (HFC-134a) - ckt 2	215.0 lb
Evap fluid type	Water		
Evap entering temp	54.00 F Evap	Evap leaving temp	44.00 F
Evap fluid concentration	0.00 %	Fluid freeze point	32.00 F
Evap flow rate	475.50 gpm		
Max Evap flow rate	883.00 gpm	Min Evap flow rate	241.00 gpm
H2O Evap fouling factor	0.00010 hr-sq ft-deg F/Btu	Press drop max Evap flow	36.80 ft. H2O
Evap configuration	2 pass		
Saturated Evap temp – ckt 1	40.10 F	Saturated Evap temp - ckt 2	40.90 F

Enclosure 1

Equipment Description Plate Frame Heat Exchanger (HEX)

The Plate Frame Heat Exchanger has a 3 million btu/hr. capacity based on the inlet temperature of 100 degrees F on the primary loop side with a secondary side cold water temperature of 76 degrees F.The primary loop will take suction from the fuel pool and discharge to the heat exchanger and return back to the fuel pool. The secondary loop will discharge to the heat exchanger and return back to the electric chiller units removing the heat load generated from the primary loop. Picture below is a conceptual drawing only not to be used for dimensional information.



Q&A about San Onofre Spent Fuel Pool Cooling Island Project

Enclosure 1

Manufacturer Performance Data

		Hot side	Cold side
Fluid		Water	Water
Density	lb/ft³	61.99	62.14
Specific heat capacity	Btu/lb., F	1.00	1.00
Thermal conductivity	Btu/ft,h,°F	0.360	0.354
Viscosity inlet	cP	0.683	0.906
Viscosity outlet	cP	0.783	0.814
Volume flow rate	GPM	500.0	700.0
Inlet temperature	°F	100.0	76.0
Outlet temperature	°F	87.9	84.6
Pressure drop	psi	4.00	7.18
Heat Exchanged	kbtu/h	3000	
L.M.T.D.	°F	13.6	
O.H.T.C clean conditions	Btu/ft²,h,°F	954.4	
O.H.T.C service	Btu/ft²,h,°F	752.2	
Heat transfer area	ft²	293.6	
Duty margin	%	26.9	
Relative directions of fluids		Countercurrent	
Number of plates		46	
Effective plates		44	
Number of passes		1	1
Extension capacity			19
Plate material / thickness		ALLOY 316 / 0.50 mm	
Sealing material		EPDMP CLIP-ON	EPDMP CLIP-ON
Connection material		Stainless steel	Stainless steel
Connection diameter		See drawing	See drawing
Nozzle orientation		S4 -> S3	S1 <- S2
Pressure vessel code		ASME	ASME
Flange rating		150#	150#
Design pressure	psi	150.0	150.0
Test pressure	psi	195.0	195.0
Design temperature	°F	200.0	200.0
Overall length x width x height	in	45 x 26 x 74	
Liquid volume		2.00 ft³	2.08 ft³

Enclosure 2

Recommended Pump Manufacturer Maintenance:

Maintenance inspections

A maintenance schedule includes these types of inspections: Routine maintenance

Routine inspections

Check the level and condition of the oil through the sight glass on the bearing frame. Check for unusual noise, vibration, and bearing temperatures.
Check the pump and piping for leaks. Analyze the vibration.
Inspect the discharge pressure.
Inspect the temperature.
Check the seal chamber and stuffing box for leaks.
Ensure that there are no leaks from the seal.

Three-month inspections

Check that the foundation and the hold-down bolts are tight.
Check the packing if the pump has been left idle, and replace as required. Change the oil every three months (2000 operating hours) at minimum.
Change the oil more often if there are adverse atmospheric or other conditions that might contaminate or break down the oil.
Check the shaft alignment, and realign as required.

Annual inspections

Check the pump capacity.
Check the pump pressure.
Check the pump power.

Bearing lubrication schedule

Type of bearing	First lubrication	Lubrication intervals
Oil-lubricated bearings	Add oil before you install and start the pump. Change the oil after 200 hours for new bearings.	After the first200 hours, change the oil every 2000 operating hours or every three months.
Grease-lubricated bearings	Grease-lubricated bearings are in-itially lubricated at the factory.	Regrease bearings every 2000 operating hours or every three months.

Enclosure 2

Oil requirements based on temperature

Temperature	Oil requirement
Bearing temperatures exceed 180°F (82oC)	Use ISO viscosity grade 100 with bearing-frame cooling or finned-tube oil cooler. The finned-tube oil cooler is standard with the HT 3196 model and optional for all other models.
Pumped-fluid temperatures exceed 350°F (17JOC)	Use synthetic lubrication.

Frame	Qts.	Oz.	ml
STi	0.5	16	400
MTi	1.5	47	1400
LTi	1.5	48	1400
XLT-i and 117	3	96	3000

Oil volume requirements

Maintenance Schedule for Trane 200 Ton Chiller Unit:

RTAC Annual Maintenance

Description

- Report in with the Customer Representative.
- Record and report abnormal conditions, measurements taken, etc.
- Review customer logs with the customer for operational problems and trends.

General Assembly

- Visually inspect for leaks and report leak check result.
- Check the condenser fans for clearances and free operation.
- Check tightness of condenser fan motor mounting brackets.
- Check the set screws on the fan shafts.
- Chemically clean and wash down condenser coils once per year.
- Verify the performance of the fan control inverter VFD, if applicable.
- Grease bearings as required.

Enclosure 2

Controls and Safeties

- Visually inspect the control panel for cleanliness.
- Inspect wiring and connections for tightness and signs of overheating and discoloration.
- Verify the working condition of all indicator/alarm lights and LED/LCD displays.
- Verify oil pressure safety device (as required). .
- Verify the operation of the chilled water pump starter auxiliary contacts.

Lubrication System

- Pull oil sample for spectroscopic analysis.
- Test oil for acid content and discoloration.
- Make recommendations to the customer based on the results of the test.
- Verify the operation of the oil heaters.

Motor and Starter

- Clean the starter cabinet and starter components.
- Inspect wiring and connections for tightness and signs of overheating and discoloration.
- Check the condition of the contacts for wear and pitting.
- Check contactors for free and smooth operation.
- Check all mechanical linkages for wear, security and clearances.
- Verify tightness of the motor terminal connections.
- Meg the motor and record readings.
- Verify the operation of the electrical interlocks.
- Measure voltage and record. Voltage should be nominal voltage ±10%.

Enclosure 2

RTAC Quarterly Operational Running Inspection

Description

- Check the general operation of the unit.
- Log the operating temperatures, pressures, voltages, and amperages.
- Check the operation of the control circuit.
- Check the operation of the lubrication system.
- Check the operation of the motor and starter.
- Review operating procedures with operating personnel.
- Provide a written report of completed work, operation log and indicate any uncorrected deficiencies detected.

Oil Sample/Spectrographic Analysis: Oil Analysis is a service provided by Trane's Chemlab in Charlotte. Oil Analysis provides an opportunity to show customers wear that is occurring in their equipment. The report is generated by the Chemlab team and can be sent to the local office to take to the customer. This is a high quality report providing the customer with data that can be used to compare year on year performance. This is a very inexpensive service that can produce strong customer satisfaction and assurance that every effort is being made to minimize their risk of equipment failure.

Campbell Hausfeld Air Compressor Recommended Maintenance:

- Check the general operation of the unit periodically.
- Change motor oil every 2000 hours or 1 year.
- Check drive belt for excessive wear or cracks every 2000 hours or 1 year.

In addition to the pump, chiller and air compressor maintenance, the Ion Exchange (IX) resin will be changed out annually. One Technician and one HP will travel to SONGS to sluice the old resin to a HIC and reload the IX columns with new resin. The new resin cost are part of the maintenance fee, however the cost of disposal of the resin is SCE responsibility.

Enclosure 2

A hose will be connected to the IX column and run through the hatch in the new fuels building to a HIC located on the ground level just below the hatch. A combination of air and water will be used to push the resin from the IX column to the HIC. After all resin has been sluiced, new resin will be loaded into the IX by drawing a vacuum in the IX with a hepa vac, and sucking the new resin into the columns.