

PUBLIC UTILITIES COMMISSION

505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298



May 12, 2023

Jim Beach
Southland Maintenance Manager
AES Redondo Beach (Legacy)
1100 N Harbor Drive
Redondo Beach, CA 90277

SUBJECT: Generation Audit report of AES Redondo Beach (Legacy)- Audit Number GA2023-11ARB

Dear Mr. Beach:

On behalf of the Electric Safety and Reliability Branch (ESRB) of the California Public Utilities Commission (CPUC), Saimon Islam and Stephen Hur of ESRB staff conducted a generation audit of AES Redondo Beach (Legacy) Power Plant from April 24, 2023, through April 28, 2023.

During the audit, ESRB observed Plant operations, inspected equipment, reviewed data, interviewed Plant staff, and identified violations of General Order (GO) 167-B. A copy of the audit findings itemizing the violations is enclosed. Please advise me by email no later than June 12, 2023, by providing an electronic copy of all corrective measures taken by AES Redondo Beach (Legacy) to remedy and prevent the recurrence of such violations. Your response should include a Corrective Action Plan with a description and completion date of each action and measure completed. For any violations not corrected, please provide the projected completion dates to correct the violations and to achieve full compliance with GO 167-B.

Please submit your response to Saimon Islam at Saimon.Islam@cpuc.ca.gov. Please note that although AES Redondo Beach (Legacy) has been given 30 days to respond, it has a continuing obligation to comply with all applicable GO 167-B requirements; therefore, the response period does not alter this continuing duty.

If you wish to make a claim of confidentiality covering any of the information in the report, you may submit a confidentiality request pursuant to Section 15.4 of GO 167-B, using the heading "General Order 167-B Confidentiality Claim". The request should be sent to Saimon Islam with a copy to me and the GO 167-B inbox GO167@cpuc.ca.gov by May 26, 2023.

If you have any questions concerning this audit, you can contact Saimon Islam at Saimon.Islam@cpuc.ca.gov or (213) 326-2600.

Sincerely,

A handwritten signature in blue ink, appearing to read "Banu Acimis".

Banu Acimis, P.E.
Program and Project Supervisor
Electric Safety and Reliability Branch
Safety and Enforcement Division
California Public Utilities Commission

Attachment: CPUC Generation Audit Findings

Cc: Lee Palmer, Director, Safety and Enforcement Division, CPUC

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Nika K Jensli, Program Manager, ESRB, CPUC
Saimon Islam, Senior Utilities Engineer (Specialist), ESRB, CPUC
Stephen Hur, Utilities Engineer, ESRB, CPUC

I. Findings Requiring Corrective Action

Finding 1: ESRB staff observed damaged insulation across the Plant.

GO 167-B, Appendix D, Maintenance Standard (MS) 9: Conduct of Maintenance states:

“Maintenance is conducted in an effective and efficient manner, so equipment performance and material condition effectively support reliable plant operation.”

GO 167-B Appendix D, MS 11: Plant Status and Configuration states:

“Station activities are effectively managed, so plant status and configuration are maintained to support reliable and efficient operation.”

ESRB staff observed some damaged insulation around the Plant in different pipe joints. Plant management must develop a program for the repair of insulation. Damaged insulation compromises thermal efficiency and exposes workers to hot piping and leads to increased corrosion under insulation and can affect the reliability of the Plant’s operation.



Figure 1: Damaged insulation around the Plant

Finding 2: ESRB staff observed minor leaks from pipes, low lube oil level, and improper drainage in the Plant.

GO 167-B, Appendix D, MS 9: Conduct of Maintenance states:

“Maintenance is conducted in an effective and efficient manner, so equipment performance and material condition effectively support reliable plant operation.”

GO 167-B Appendix E, Operation Standards (OS) 13: Routine Inspections states in part:

“Routine inspections by plant personnel ensure that all areas and critical parameters of plant operations are continually monitored, equipment is operating normally, and that routine maintenance is being performed...”

ESRB staff observed low lube oil level in 6 E. SCR Blower (A) motor. The staff also observed a leakage in the Reverse Osmosis (RO) truck. One of the oil spill kits had broken seals resulting rainwater to go inside and damage the stuff inside the kit. One of the drain lines in Fire Water Pump was not properly tied to the drain resulting in water splitting outside. Also, one drain line was clogged resulting in standing water which is a slip hazard for Plant employees, contractors, and visitors.



Figure 2: Low lube oil level in 6 E. SCR Blower (A)



Figure 3: Minor leak in RO truck (left) and another minor leak (right)



Figure 4: Oil Spill Kit had deteriorated stuff inside due to rainwater entering the drum



Figure 5: Drain line not properly tied to drain (Left) and a clogged drain resulting in standing water (Right)

Finding No. 3: ESRB staff noted a lack of inspection and maintenance for some equipment.

GO 167-B, Appendix D, MS 9: Conduct of Maintenance states:

“Maintenance is conducted in an effective and efficient manner, so equipment performance and materiel condition effectively support reliable plant operation.”

GO 167-B, Appendix E, OS 8: Plant Status and Configuration states:

“Station activities are effectively managed, so plant status and configuration are maintained to support safe, reliable and efficient operation.”

ESRB staff observed that the seals of the Unit 5 and 6 circulating water discharge cover was damaged which resulted in water leakage on the ground. Gas cylinders in the storage area were not properly tied (missing bottom chain links). One small rod outside the boiler unit was loose. One of the abandoned equipment had a broken sharp edge which is a hazard for Plant personnel. One of the covers of a confined space was corroded and damaged.



Figure 6: Water leakage (Left) and a damaged sharp edge on abandoned equipment (Right)



Figure 7: Cylinders missing bottom chain links (Left) and cylinders with proper chain links (Right)



Figure 8: Corroded and damaged Confined Space cover

Finding No. 4: ESRB staff observed several defective gauges.

GO 167-B, Appendix D, MS 9: Conduct of Maintenance states:

“Maintenance is conducted in an effective and efficient manner, so equipment performance and materiel condition effectively support reliable plant operation.”

ESRB staff found numerous defective gauges. Gauges are important for proper operation as they indicate different readings such as pressure, temperature, etc. Plant personnel must repair the defective gauges.



Figure 9: Damaged gauges

Finding No. 5: ESRB Staff observed a few electrical panels missing an updated Arc Flash Stickers.

GO 167-B, Appendix E, OS 1: Safety states in part:

“The protection of life and limb for the work force is paramount. GAOs have a comprehensive safety program in place at each site...”

GO 167-B, Appendix E, OS 13: Routine Inspection, states in part:

“Routine inspections by plant personnel ensure that all areas and critical parameters of plant operations are continually monitored, equipment is operating normally, and that routine maintenance is being performed....”

GO 167-B, Appendix E, OS 10: Environmental Regulatory Requirements states:

“Environmental regulatory compliance is paramount in the operation of the generating asset. Each regulatory event is identified, reported and appropriate action taken to prevent recurrence.”

ESRB Staff observed that some electrical panels didn't have an updated Arc Flash Sticker as per the requirements of The National Fire Protection Association (NFPA 70E). Arch Flash analysis and updated stickers are important for the safety of the employees and contractors. The Plant must ensure all electrical cabinets have updated Arc Flash analysis.



Figure 10: Missing Arc Flash Stickers

Finding No. 6: ESRB staff found a lack of inspection and maintenance in the circulating water pump pit Unit number 8.

GO 167-B, Appendix D, MS 9: Conduct of Maintenance, states:

“Maintenance is conducted in an effective and efficient manner, so equipment performance and materiel condition effectively support reliable plant operation.”

GO 167-B, Appendix D, MS 11: Plant Status and Configuration states:

“Station activities are effectively managed so plant status and configuration are maintained to support safe, reliable and efficient operation.”

ESRB staff observed leakage in circulating water pump pit Unit number 8. There was standing water and severe corrosion in pipe joints and in some flanges. Plant personnel must inspect the areas and take necessary steps to reduce the corrosion, fix the leak, and change the flanges if required.

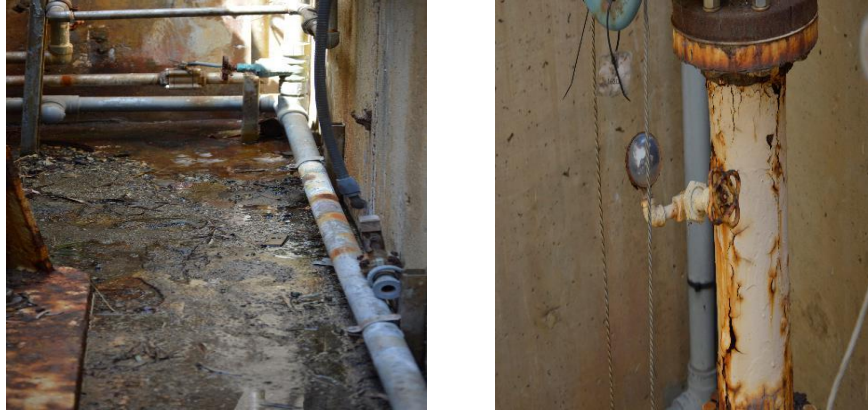


Figure 11: Corrosion in circulating water pump unit



Figure 12: Corrosion in flange (left) and standing water (right)

Finding No. 7: ESRB staff observed some fire extinguishers missing annual inspection tags.

GO 167-B, Appendix E, OS 1: Safety states in part:

“The protection of life and limb for the work force is paramount. GAOs have a comprehensive safety program in place at each site.”

GO 167-B, Appendix E, OS 13: Routine Inspection states in part:

“Routine inspections by plant personnel ensure that all areas and critical parameters of plant operations are continually monitored, equipment is operating normally, and that routine maintenance is being performed....”

ESRB staff observed a couple of fire extinguishers missing annual inspection tags. Fire extinguishers are important for the safety of the employees and the Plant must inspect annually all the extinguishers as per California Code of Regulations (CCR) Title 19, Division 1, Chapter 3, Article 6, Section 575.



Figure 13: Fire extinguishers with missing current annual inspection tags.

Finding No. 8: ESRB Staff observed several unmarked High Energy Pipe (HEP) supports.

GO 167-B, Appendix D, MS 9: Conduct of Maintenance, states:

“Maintenance is conducted in an effective and efficient manner, so equipment performance and materiel condition effectively support reliable plant operation.”

GO 167-B, Appendix D, MS 11: Plant Status and Configuration states:

“Station activities are effectively managed so plant status and configuration are maintained to support safe, reliable and efficient operation.”

ESRB staff observed several unmarked HEP supports. Unmarked supports do not allow Plant personnel to determine if systems are within proper operating range. Inspection of Pipe, Pipe Supports and Restrains titled “OST Report No. 2223 - (381-22) - Redondo Beach - Unit 8 - FINAL.pdf” recommended changing all mechanical snubbers.



Figure 14: Unmarked HEP supports

Finding No. 9: ESRB Staff found that the Plant performed the last generator polarization test in 2017.

GO 167-B, Appendix D, MS 9: Conduct of Maintenance, states:

“Maintenance is conducted in an effective and efficient manner, so equipment performance and materiel condition effectively support reliable plant operation.”

GO 167-B, Appendix E, OS 13: Routine Inspection states in part:

“Routine inspections by plant personnel ensure that all areas and critical parameters of plant operations are continually monitored, equipment is operating normally, and that routine maintenance is being performed....”

ESRB staff found that the last polarization test for the generator was done in 2017. Polarization test will evaluate its windings for build up of dirt or moisture, deterioration of the insulation, fitness for high potential tests and suitability for further operation.

Finding 10: ESRB staff observed excessive dissolved oxygen in condenser and deaerator.

GO 167-B, Appendix E, OS 4: Problem Resolution and Continuing Improvement states:

“The GAO values and fosters an environment of continuous improvement and timely and effective problem resolution.”

GO 167-B, Appendix E, OS 13: Routine Inspection states in part:

“Routine inspections by plant personnel ensure that all areas and critical parameters of plant operations are continually monitored, equipment is operating normally, and that routine maintenance is being performed....”

GO 167-B, Appendix D, MS 9: Conduct of Maintenance, states:

“Maintenance is conducted in an effective and efficient manner, so equipment performance and materiel condition effectively supports reliable plant operation.”

ESRB staff observed excessive dissolved oxygen from feedwater analysis logs in condenser and deaerator tank on Unit-6 and Unit-8. The dissolved oxygen causes pitting, corrosion, and fatigue leading to tube rupture. It is also highly possible to have other dissolved corrosive gases such as carbon dioxide and ammonia in the feedwater line along with dissolved oxygen. Regardless of the difference of water treatment methods between Unit-6 and Unit-8, dissolved gases should be controlled under target ranges and removed from the feedwater systems. Unit-6 dissolved oxygen in feedwater was observed at 40 ppb with control limit 5 ppb. Unit-8 also showed high dissolved oxygen levels of 200~400 ppb with AVT (All-Volatile Treatment) and/or OT (Oxygenated Treatment) at deaerator inlet while the control limits are 15 ppb AVT / 30~150 ppb OT on the Plant’s water treatment procedure. The Plant experienced multiple boiler tube ruptures caused by tube corrosion in the past. Dissolved oxygen level is the indicator of the functionality and integrity of pertinent equipment and operation practice. It is critical that any condenser air in-leakage and air removal systems like air ejector and deaerator are to be inspected routinely, adjusted, and repaired to bring down dissolved oxygen level under control limits and mitigate corrosion.

Finding No. 11: ESRB Staff observed stop valves installed at upstream of relief valves on heat exchangers.

GO 167-B, Appendix E, OS 1: Safety states in part:

“The protection of life and limb for the work force is paramount. GAOs have a comprehensive safety program in place at each site.”

GO 167-B, Appendix D, MS 11: Plant Status and Configuration states:

“Station activities are effectively managed so plant status and configuration are maintained to support safe, reliable and efficient operation.”

29 Code of Federal Regulation (CFR) 1910.169(b)(3)(ii) states:

“No valve of any type shall be placed between the air receiver and its safety valve or valves,”

29 CFR 1910.169(a)(2)(ii) states, in part:

“All safety valves used shall be... installed... in accordance with the A.S.M.E. Boiler and Pressure Vessel Code, Section VIII.”

ESRB staff observed stop valves installed at the upstream of relief valves on heat exchangers.

Federal OSHA interpretation on the stop valve upstream of relief valve states:

“Note that the reference to ASME B&PV code Appendix states the exception as: “Under conditions set forth in Appendix M.”, and that the introduction to Appendix M indicates that any rule contained in Appendix M is for general information only, not a mandatory part of Section VIII, but may be permitted when granted by the authority having legal jurisdiction over the installation of unfired pressure vessels.

Therefore, the jurisdiction in the state or municipality operating under the ASME Code Section VIII may authorize a stop valve between the pressure-relieving device and the unfired pressure vessel.”

CPUC recognizes special allowance for stop valves if “procedures specified in the governing edition of the ASME Boiler and Pressure Vessel Code Section VIII Appendix M are followed” and the valves are “locked open whenever any relief device upstream is in service”.

2013 B&PV Code Section VIII Appendix M-5.6 specifies requirement that isolate the pressure relief valve exclusively for inspection and repair purposes only [M-5(a), M-6], and those systems in which the pressure originates exclusively from an outside source [M-5(b)].

AES Redondo Beach Plant needs to eliminate any possible safety hazard from the installed stop valves on the heat exchanger relief valves. Additionally, the Plant needs to clarify the justification of the stop valve installation with the authority having legal jurisdiction and update the Operation and Maintenance Plan for the relief valves with stop valves by adhering to B&PV Code Section VIII, Appendix M to ensure safety and reliability.



Figure 15: Stop valves installed at upstream of relief valves on heat exchangers

II. Documents Reviewed

Category	Reference #	CPUC-Requested Documents
Safety	1	Orientation Program for Visitors and Contractors (Onsite)
	2	Evacuation Procedure
	3	Evacuation Map and Plant Layout
	4	Evacuation Drill Report & Critique (last 3 years)
	5	Hazmat Handling Procedure
	6	SDS for All Hazardous Chemicals
	7	Injury & Illness Prevention Plan (IIPP)
	8	OSHA Form 300 (Injury Log) in last 4 years
	9	OSHA Form 301 (Incident Report) in last 4 years
	10	List of all CPUC Reportable Incidents (last 5 years)
	11	All Root Cause Analyses (last 5 years)
	12	Fire Protection System Test Report and Inspection Record (last 3 years)
	13	Insurance Report / Loss Prevention / Risk Survey (last 3 years)
	14	Lockout / Tagout Procedure
	15	Arc flash Analysis
	16	Confined Space Entry Procedure
	17	Plant Physical Security and Cyber Security Procedures
Training	18	Safety Training Records
	19	Skill-related Training Records
	20	Certifications for Welders, Forklift & Crane Operators
	21	Hazmat Training and Records
Contractor	22	Latest list of Qualified Contractors
	23	Contractor Selection / Qualification Procedure

	24	Contractor Certification Records
	25	Contractor Monitoring Program
Regulatory	26	Daily CEMS Calibration Records (Onsite)
	27	Air Permit
	28	Water Permit
	29	Spill Prevention Control Plan (SPCC)
	30	CalARP Risk Management Plan (RMP)
O&M	31	Daily Round Sheets / Checklists (Onsite)
	32	Feedwater Grab-sample Test Records
	33	Water Chemistry Manual
	34	Logbook (Onsite)
	35	List of Open/Backlogged Work Orders
	36	List of Closed/Retired Work Orders
	37	Work Order Management Procedure
	38	Computerized Maintenance Management System (Demonstration Onsite)
Gas Turbine	39	Maintenance & Inspection Procedures (or Related Documents)
	40	Borescope Inspection Reports (last 2 years)
	41	Hot Gas Path Inspection Reports
	42	Combustors Inspection Reports
	43	Intercooler Inspection Reports (if applicable)
	44	Overspeed Trip Test Records
	45	Bearing Lube Oil Analysis Reports
	46	DC Lube Oil Pump Test Records
Main Plant Air Compressors	47	Inspection Procedures and Records
Document	48	P&IDs
	49	Vendor Manuals (Onsite)

Spare Parts	50	Spare Parts Inventory List
	51	Shelf-life Assessment Procedures and Reports
Management	52	Employee Performance Review Procedures and Verifications
	53	Organizational Chart
HRSG	54	Tube Analysis Report
	55	Tube Clean Records (Internal and/or external)
	56	Safety Valve Test Records
	57	Hot Spots / IR Inspection Reports
	58	Structural Integrity Assessment
HEP	59	FAC Inspection Procedure & Measurements
	60	Pipe Hangers / Support Calibration Records
Steam Turbine	61	NDE Reports
	62	Borescope Inspection Records
	63	Most recent major STG inspection report
	64	STG inspection reports
	65	Overspeed Trip Test Records
	66	Bearing Lube Oil Analysis Reports
	67	DC Lube Oil Pump Test Records
	68	Emergency Stop Valve Test Records on Main Steam Line
	69	Steam Turbine Water Induction Prevention Procedures
Generator (Combustion and Steam Turbine Generators)	70	Bearing Lube Oil Analysis
	71	Maintenance & Inspection Procedures (or related documents)
	72	Electrical Test Records (Reactive power verification, excitation control modeling, polarization, etc.)
Transformers (All)	73	Hot Spots / IR Inspection Reports
	74	Oil Analysis Reports
Cathodic Protection	75	Procedures and Inspection Records

Air Cooled Condenser System	76	Cooling Fans & Motors Inspection Records
	77	Cooling Tower Structural Integrity Assessment
	78	Circulating Water Pumps Maintenance Records
Instrumentation	79	Instrument Calibration Procedures and Records
Test Equipment	80	Calibration Procedures and Records
Emission Control Equipment (SCR, Ammonia, NOx, CO)	81	Maintenance & Inspection Procedures and Records
Internal Audit	82	Internal Audit Procedures and all Records