PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

March 13, 2024

Jorge Pedron
Chief Operations Officer & Head of Onshore
Shiloh Wind Project
6283 Montezuma Hills Road,
Birds Landing, CA 94512

SUBJECT: **Generation Audit of Shiloh Wind Project - Audit Number GA2023-16SW**

Dear Mr. Pedron:

On behalf of the Electric Safety and Reliability Branch (ESRB) of the California Public Utilities Commission (CPUC), Matthew Yunge, Timothy Smith, and Christopher Villalobos of ESRB staff conducted a generation audit of Shiloh Wind Project (Shiloh) from January 22 through January 24, 2024.

During the audit, ESRB observed plant operations, inspected equipment, reviewed data, interviewed plant staff, and identified potential violations of General Order (GO) 167-B. A copy of the audit findings itemizing the violations is attached. Please advise me by email no later than April 10, 2024, by providing an electronic copy of all corrective actions and preventive measures taken and/or planned to be taken to resolve the 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 achieve full compliance with GO 167-B.

Please submit your response to Matthew Yunge at Matthew.Yunge@cpuc.ca.gov. Please note that although Shiloh 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.

The CPUC intends to publish the audit report for Shiloh on the CPUC website. 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" along with such redactions. Per GO 167-B Rule 15.4, the confidentiality claim should be for specific items and provide its corresponding justification, as opposed to a blanket confidentiality claim on the entire audit report. The confidentiality request and redacted version of the audit report should be sent to Matthew Yunge with a copy to me and the GO 167 inbox GO167@cpuc.ca.govby April 10, 2024.

Please note that ESRB will also post Shiloh’s audit report response on the CPUC website. If there is any information in your response that you would like us to consider as confidential, we request that in addition to your confidential response, you provide us with a redacted version of your audit response that can be posted on the CPUC website by April 10, 2024.

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Thank you for your courtesy and cooperation throughout the audit process. If you have any questions concerning this audit, please contact Matthew Yunge at Matthew.Yunge@cpuc.ca.gov. or (415)-603-9828.

Sincerely,

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
Nika Kjensli, Program Manager, ESRB, SED, CPUC
Rickey Tse, Program and Project Supervisor, ESRB, SED, CPUC
Matthew Yunge, Senior Utilities Engineer - Specialist, ESRB, SED, CPUC
Timothy Smith, Utilities Engineer, ESRB, SED, CPUC
Christopher Villalobos, Utilities Engineer, ESRB, SED, CPUC

CPUC AUDIT FINDINGS OF SHILOH WIND PROJECT January 22 – January 24, 2024

I. Findings

Finding 1: The Plant lacks a standardized process for tracking maintenance work for high voltage assets.

General Order (GO) 67-B, Appendix D, Maintenance Standard (MS) 3: Maintenance Management and Leadership states:

> *"Maintenance managers establish high standards of performance and align the maintenance organization to effectively implement and control maintenance activities."*

GO 167-B, Appendix D, MS 4: Problem Resolution and Continuing Improvement states:

> *"The company values and fosters an environment of continuous improvement and timely and effective problem resolution."*

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 13: Equipment Performance and Materiel Condition states:

> *"Equipment performance and materiel condition support reliable plant operation. This is achieved using a strategy that includes methods to anticipate, prevent, identify, and promptly resolve equipment performance problems and degradation."*

GO 167-B, Appendix E, Operation Standard (OS) 9: Engineering and Technical Support states:

> *"Engineering activities are conducted such that equipment performance supports reliable plant operation. Engineering provides the technical information necessary for the plant to be operated and maintained within the operating parameters defined by plant design. Engineering provides support, when needed, to operations and maintenance groups to resolve operations and maintenance problems."*

Maintenance work at the Shiloh Wind Project ("the Plant") is generally divided between the Operations staff and the Balance of Plant ("BOP") team. Maintenance of high voltage assets (e.g. substation equipment and padmount transformers) is handled by a high voltage (HV) specialist, who is part of the BOP team. The Plant's Operations staff are responsible for the inspection of the Plant's assets, collection of oil samples, and execution of maintenance work for most of the wind turbine generators (WTG). Some of the WTG maintenance is managed by Avangrid's internal engineering group.

In general, HV work is done on a 3-year basis to match scheduled North American Electric Reliability Corporation (NERC) outages. However, the Avangrid BOP team does not have a system that actively tracks HV-related maintenance tasks between scheduled NERC outages. The HV specialists, each of whom might be covering multiple Avangrid wind farm sites, track maintenance items whichever way HV specialists choose. Also, the BOP staff stated that the general practice is to compile HV maintenance work based on a monthly inspection form created by the site's operations team a few months prior to a scheduled NERC outage. When ESRB asked if the BOP team could produce a log of HV maintenance tasks that the BOP team is tracking, the BOP staff's response was that no such list could be made without reaching out directly to the HV specialist assigned to that site. The Plant staff stated that there are two HV specialists currently assigned to the Plant. The fact that two HV specialists are responsible for the Plant results in the chance of miscommunication of maintenance tracking and resolution, leaving identified issues unresolved due to each specialist's unique and separate tracking system.

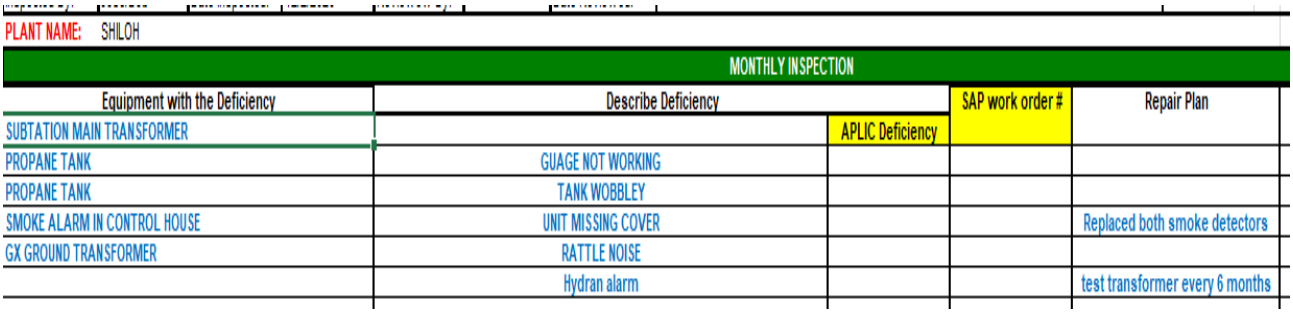
Furthermore, there are signs of failure to communicate between Operations and the BOP teams. ESRB observed maintenance issues that were reported by Operations to the BOP team via a monthly inspection form dating back to 2021. Some of those issues do not require direct interaction with high voltage equipment (e.g. peeling paint on the substation control building, cracked glass on the power transformer's oil temperature gauge). HV specialists use the time during NERC outages to correct identified issues. Issues that were identified prior to a 2021 NERC outage were still unresolved by the time ESRB conducted its 2024 audit.[1,2] Operations staff mentioned that for maintenance issues that do not require direct interaction with high voltage assets, the BOP team will allow Operations to handle those tasks with the HV specialist serving as a consultant. Therefore, the fact that some of these substation maintenance issues were unresolved at the time of ESRB's 2024 audit highlights either a deficiency of communication between Operations and the BOP team, or a failure to follow up on communications from the BOP team to resolve substation issues.

As an example, the BOP director mentioned that the gauges for the power transformer are considered a priority to be fixed. Therefore, it is concerning that the power transformer's oil temperature gauge was not repaired in the last NERC outage. Similarly in this audit, ESRB found that the power transformer's Hydran alarm was not functioning and that the recommended action was to test the transformer semiannually.[3] However, the Operations team was only testing that transformer on an annual basis because the BOP team did not create the work order to test the transformer more frequently.

Overall, the workflow between the Operations and BOP teams is problematic for a site that relies on one power transformer operating at all times, especially when the lead time to get a temporary replacement transformer is approximately six to eight weeks.

[1] The last planned NERC outage was in 2021.
[2] Plant Excel file "SHI Sub Inspection Forms_20211118_R4.xlsx" indicates that the substation high voltage assets were tested and inspected in November 2021.
[3] A Hydran alarm is a device used to monitor transformers for faulty conditions.

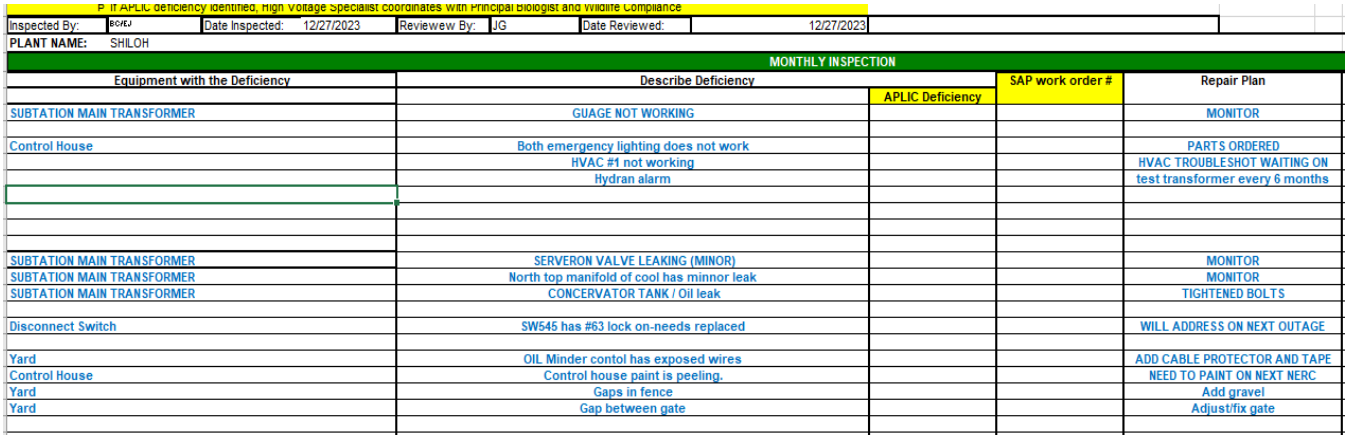
Below are example screenshots of identified issues that were left unresolved between January 2021 and December 2023.



PLANT NAME: SHILOH

MONTHLY INSPECTION				
Equipment with the Deficiency	Describe Deficiency	APLIC Deficiency	SAP work order #	Repair Plan
SUBTATION MAIN TRANSFORMER				
PROPANE TANK	GUAGE NOT WORKING			
PROPANE TANK	TANK WOBBLEY			
SMOKE ALARM IN CONTROL HOUSE	UNIT MISSING COVER			Replaced both smoke detectors
GX GROUND TRANSFORMER	RATTLE NOISE			
	Hydran alarm			test transformer every 6 months

Figure 1. Substation monthly inspection form from January 2021.



If APLIC deficiency identified, High Voltage Specialist coordinates with Principal Biologist and Wildlife Compliance

Inspected By: BCAEJ | Date Inspected: 12/27/2023 | Reviewew By: JG | Date Reviewed: 12/27/2023

PLANT NAME: SHILOH

MONTHLY INSPECTION				
Equipment with the Deficiency	Describe Deficiency	APLIC Deficiency	SAP work order #	Repair Plan
SUBTATION MAIN TRANSFORMER	GUAGE NOT WORKING			MONITOR
Control House	Both emergency lighting does not work			PARTS ORDERED
	HVAC #1 not working			HVAC TROUBLESHOT WAITING ON
	Hydran alarm			test transformer every 6 months
SUBTATION MAIN TRANSFORMER	SERVERON VALVE LEAKING (MINOR)			MONITOR
SUBTATION MAIN TRANSFORMER	North top manifold of cool has minnor leak			MONITOR
SUBTATION MAIN TRANSFORMER	CONCERVATOR TANK / Oil leak			TIGHTENED BOLTS
Disconnect Switch	SW545 has #63 lock on-needs replaced			WILL ADDRESS ON NEXT OUTAGE
Yard	OIL Minder contol has exposed wires			ADD CABLE PROTECTOR AND TAPE
Control House	Control house paint is peeling.			NEED TO PAINT ON NEXT NERC
Yard	Gaps in fence			Add gravel
Yard	Gap between gate			Adjust/fix gate

Figure 2. Substation monthly inspection form from December 2023.

Figure 1 above shows an issue with a Hydran alarm that was identified in 2021. Plant staff filled out that form in January 2021. That same issue is still present in December 2023, as seen in Figure 2. In both inspections, there is a note to test the power transformer every 6 months. However, at the time of the audit, there was no work order that directed operations staff to test the transformer at that timeframe.

Proper maintenance practices require regular communication of maintenance issues and tasks between the different lines of business. If an HV specialist determines that an asset needs to be tested more frequently, then that task needs to be properly assigned to the Operations team.

Similarly, there are monthly reports over a three-year period that reported an issue with a broken transformer gauge that was present from January 2021 to December 2023. Figure 8 is a photograph of the damaged transformer gauge. The Plant technicians and BOP team need to establish a standardized tracking system for the maintenance of High Voltage assets and ensure issues reported

are resolved in an appropriate timeframe.

Finding 2: Hazardous waste containers are corroded.

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

> *"The protection of life and limb for the work force is paramount. GAOs have a comprehensive safety program in place at each site. The company behavior ensures that personnel at all levels of the organization consider safety as the overriding priority. This is manifested in decisions and actions based on this priority. The work environment and the policies and procedures foster such a safety culture, and the attitudes and behaviors of personnel are consistent with the policies and procedures."*

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 is taken to prevent recurrence."*

California Code of Regulations, 66265.171, Condition of Containers states:

"If a container holding hazardous waste is not in good condition (e.g., severe rusting, apparent structural defects), or if it begins to leak, the owner or operator shall transfer the hazardous waste from this container to a container that is in good condition, or manage the waste in some other way that complies with the requirements of this chapter."

ESRB observed hazardous waste containers with corrosion at the Plant's O&M facility. In order to prevent leaks that could harm personnel or the environment, hazardous waste containers should be free of rust or other structural defects. The Plant staff stated that that was the condition of the containers upon receipt by a contracted provider. The Plant management reached out to the contracted provider and one of the defective containers was removed with assurances that future barrels provided to the Plant would be free of rust. One additional container remained that had mild corrosion on it.

Figure 3. Waste barrel with corrosion.


Figure 4. Second waste barrel with corrosion.

Finding 3: Oil seepage and bird nest found at main transformer.

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 observed oil leaking from the power transformer at the Plant's substation. In order to maintain reliable operation, transformer oil leaks should be addressed promptly. This is especially important for the power transformer, as all the power of the plant is delivered via this transformer and the lead time for the Plant to procure a temporary replacement transformer is approximately six to eight weeks. However, these oil leaks were observed by the Plant staff in January of 2021, were not addressed during the NERC outage later that year and were still present in the field at the time of ESRB's audit in January 2024.

Similarly, ESRB observed a broken oil temperature gauge on the power transformer. Similar to the power transformer's oil leaks, the oil temperature gauge has been broken since January 2021 and was not corrected during the NERC outage. In order to prevent further damage and ensure reliable transformer operation, the power transformer's oil temperature gauge issue should be appropriately corrected.

ESRB also observed a bird nest near one of the fans of the power transformer. Bird nests can block air flow around transformer radiator fins and inhibit the transformer's ability to regulate its oil temperature. Plant staff expressed concern that removing any bird nest is against California law. However, the California Fish and Game Code, Section 3503 states that:

*"It is unlawful to take, posses, or **needlessly destroy** the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto." [emphasis added]*

ESRB's understanding is that removal of the bird nest in order to maintain equipment operation is acceptable, provided that the nest is not an active nest.

Figure 5. Oil leak from Serveron valve.

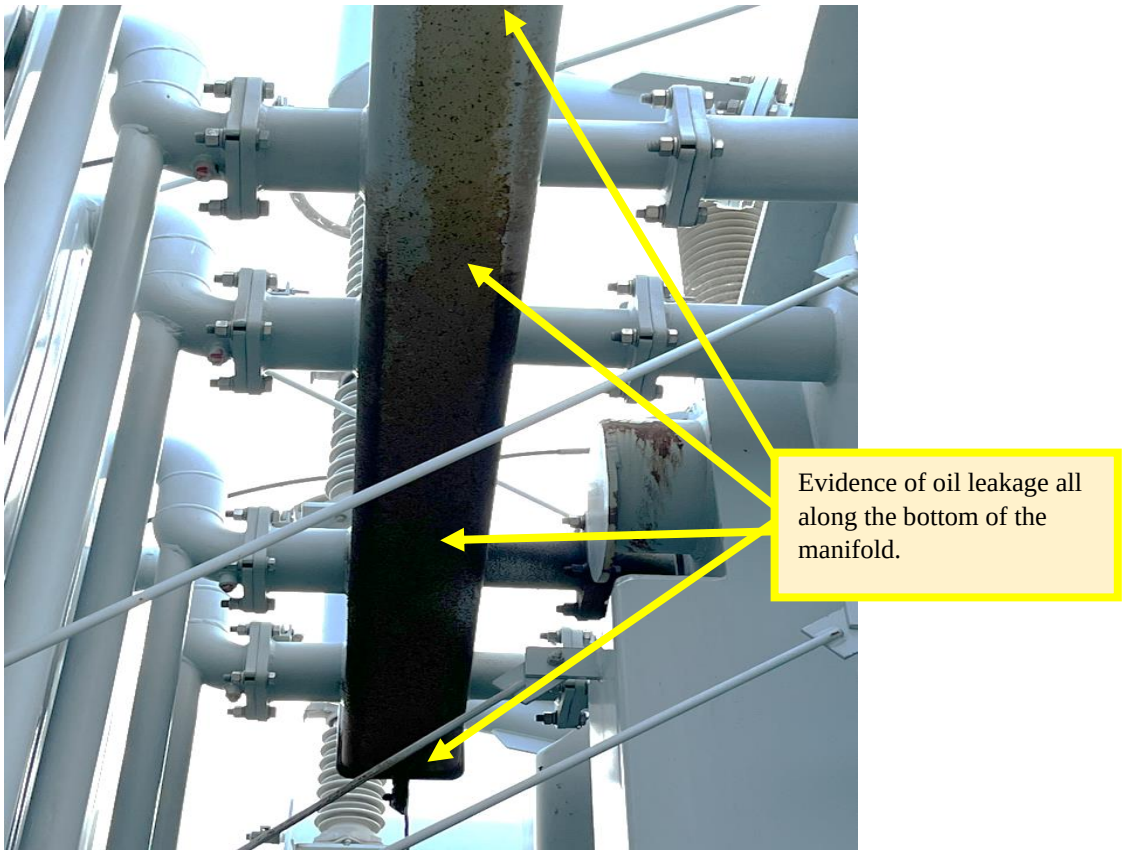


Figure 6. Additional Oil seepage in manifold between transformer body and radiator fins.

Serveron and Morgan-Shaffer Calisto Monitoring System								
Record Analog Value (PPM)								
Nitrogen - N	Hydrogen - H2	Oxygen - O	Methane - CH4	Carbon Monoxide - CO	Carbon Dioxide - CO2	Ethylene - C2H4	Ethane - C2H6	Acetylene - C2H2
Digitals Values								
No Alarms and Unit On (Hi-Hi, Rate of Change, Internal Diagnostics)								
Comments below (Include a Note for any Not Acceptable Condition):								
GLASS FOR OIL TEMP GAUGE CRACKED; SERVERON VALVE LEAKING (MINOR); CONCERVATOR TANK / Oil leak / Rust through cabinet.								

... | Substation Aux Equip Inspection | **Power Transformer Inspection** | Cntl House Outside | Exterior Fdr Brkr Cub | Cntl House Inside In: ...

Figure 7. Screenshot of power transformer inspection from January 2021.

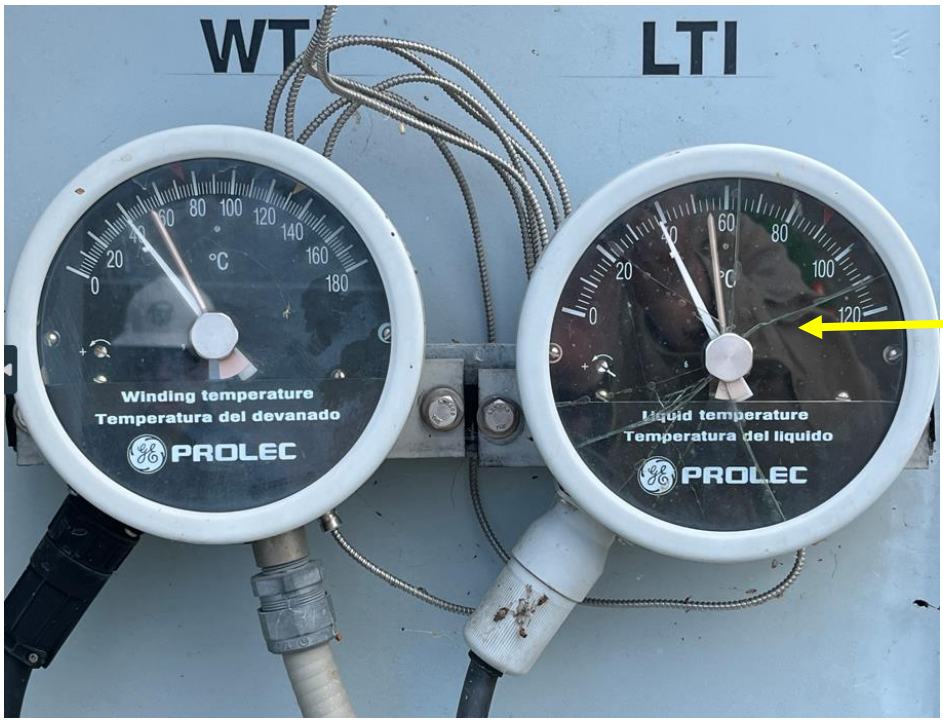


Figure 8. Cracked oil temperature gauge.

Figure 9. Bird nest near radiator fans.

Finding 4: Insufficient grading and water drainage at WTG F4.

GO 167-B, Appendix D, 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 observed issues related to the grading and water drainage around WTG F4. First, the concrete pad that supports the padmount transformer for WTG F4 is not fully supported by the ground. One edge of the pad is elevated over the ground. Further erosion around the pad could cause the transformer to lean and possibly impact Plant operation.

ESRB also observed a large amount of standing water at the base of the WTG F4 tower. That body of water extended to, and fully surrounded, the stairs leading into the tower. The presence of standing water pooling at the site could indicate erosion issues around the tower. General Electric's maintenance manual requires that visual inspections should include identifying water erosion/intrusion around the foundation. The presence of standing water surrounding the entrance to the tower could also be a slipping hazard.

Below is an excerpt from General Electric's Maintenance Manual:

1. *Foundation*
   1.1 Down Tower Inspections

Visual Inspections

In addition to the standard visual inspections checks perform visual inspections and system checks on the following Down Tower items.

- *Stairs, rails and doors*
- *Note any hazards such as road washouts, overgrown vegetation and report to customer*
- *Proper function of emergency release on door*
- *Water erosions / intrusion around foundation*
- *Concrete and grout cracks, flaking or missing elements around foundation*
- *Secure mounting of anchor points for nacelle hoists (only on 139m hybrid tower)*
- *Foundation drain pipe (if equipped) and filter are clear of grease, oil and debriss*

Figure 10. Base of padmount transformer at WTG F4.

Figure 11. Tower base and stairs of WTG F4.

Finding 5: Missing bolt covers.

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 observed multiple instances in which bolt covers at the base of wind towers had been removed, presumably by livestock. Three bolt covers were missing from WTG B16R and four were missing from WTG F4. The bolt covers protect the exterior bolts from damage from the environment. The covers for all bolts at the base of wind towers throughout the Plant should be maintained and replaced to maintain the towers' structural integrity.

Figure 10. Missing bolt covers at tower base of WTG F4.

II. List of 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	MSDS for All Hazardous Chemicals
	7	Injury & Illness Prevention Plan (IIPP)
	8	OSHA Form 300 (Injury Log) in the last 4 years
	9	OSHA Form 301 (Incident Report) in the last 4 years
	10	List of all CPUC Reportable Incidents (last 5 years)
	11	Root Cause Analysis of all Reportable Incidents or Major Equipment Failures
	12	Fire Protection System Test Reports and Inspection Records (last 3 years)
	13	Lockout / Tagout Procedure, In Plant Clearance Procedures
	14	Arcflash Analysis
	15	Confined Space Entry Procedure
	16	Plant Physical and Cyber Security Procedures
	17	Work at Height Procedure and Climb Certifications
	18	Emergency Preparedness and Response Plan
Training	19	Safety Training Records
	20	Skill-related Training Records
	21	Certifications for Welders, Forklift & Crane Operators
	22	Hazmat Training and Records
Contractor	23	Latest list of Qualified Contractors

Category	Reference #	CPUC-Requested Documents
	24	Contractor Selection / Qualification Procedure
	25	Contractor Certification Records
	26	Contractor Monitoring Program
Regulatory	27	Air Permit (if applicable)
	28	Spill Prevention Control Plan (SPCC)
O&M	29	Checklists (Onsite)
	30	Logbook (Onsite)
	31	List of all Open/Backlogged Work Orders
	32	List of Closed/Retired Work Orders
	33	Work Order Management Procedure
	34	Computerized Maintenance Management System (Demonstration Onsite)
	35	Standard Operating Procedures
	36	Transformer Oil and Turbine Bearing Oil Analysis Reports
	37	Substation inspection records
	38	Test and inspection records of high voltage equipment
	39	Maintenance & Inspection Procedures for wind turbines
	40	Maintenance & Inspection Procedures for generators
	41	Maintenance & Inspection Procedures for transformers
	42	Maintenance & Inspection Procedures for gearboxes
	43	Maintenance & Inspection Procedures for other equipment
	44	Maintenance & Inspection Records for wind turbines
	45	Maintenance & Inspection Records for generators
	46	Maintenance & Inspection Records for transformers
	47	Maintenance & Inspection Records for gearboxes
	48	Maintenance & Inspection Records for other equipment

Category	Reference #	CPUC-Requested Documents
	49	SCADA System (Demonstration on-site)
Documents	50	Electrical Single-Line Diagrams
	51	Turbine design data
	52	Vendor Manuals (Onsite)
Spare Parts	53	Spare Parts Inventory List
Management	54	Employee Performance Review Procedures and Verifications
	55	Organizational Chart
Instrumentation	56	Instrument Calibration Procedures and Records
Test Equipment	57	Calibration Procedures and Records
Internal Audit	58	Internal audit reports