STATE OF CALIFORNIA GAVIN C. NEWSOM, *Governor*

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

September 5, 2019

Pablo Hernandez, Plant Manager
Shiloh Wind Project
6283 Montezuma Hills Road
Birds Landing, CA 94512

SUBJECT: **General Order (GO) 167 Compliance Audit of Shiloh Wind Project Audit Number GA2019-02SH**

Dear Mr. Hernandez:

The Electric Safety and Reliability Branch (ESRB) of the California Public Utilities Commission (CPUC) has completed and enclosed the audit report for the 2019 Shiloh Wind Project (Shiloh) audit that was conducted from July 15 through July 19, 2019.

During the audit, ESRB observed plant operations, inspected equipment, reviewed data, and interviewed plant staff. From these activities, ESRB identified violations of GO 167, observations and recommendations, which are listed in Sections IV and V of the report. Please provide a written response within 30 days of your receipt of this letter, indicating the corrective actions and preventive measures taken and/or planned to take to resolve the violations and address the recommendations.

Your response should include a Corrective Action Plan with a description and completion date of each action and measure completed within 30 days. For any violations not corrected within 30 days, please provide the projected completion dates to correct the violations and to achieve full compliance with GO 167. If you believe the report contains factual errors, you may discuss those in your response.

Please submit your response to Rickey Tse at Rickey.Tse@cpuc.ca.gov. After ESRB reviews your response, a follow-up meeting may be scheduled for further discussion. Please note that although Shiloh has been given 30 days to respond, it has a continuing obligation to comply with all applicable GO 167 requirements. The 30-day period does not alter this continuing duty.

If you wish to make a claim of confidentiality covering any of the information in the report, please submit a confidentiality request pursuant to Section 15.4 of GO 167, using the heading "General Order 167 Confidentiality Claim". Please send the request to Charlyn Hook at Charlyn.Hook@cpuc.ca.gov of our Legal Division, with a copy to Rickey Tse and me.

Thank you for your courtesy and cooperation throughout the audit process. If you have any questions concerning this audit, please contact Rickey Tse at (415) 355-5581 or Rickey.Tse@cpuc.ca.gov.

Sincerely,

Banu Acimis
Program and Project Supervisor
Electric Safety and Reliability Branch
Safety and Enforcement Division

Attachment:
2019 Audit Report of Shiloh Wind Project

Cc:
Lee Palmer, Director, Safety and Enforcement Division, CPUC
Charlotte TerKeurst, Program Manager, ESRB, CPUC
Charlyn Hook, Legal Division, CPUC
Rickey Tse, Senior Utilities Engineer, ESRB, CPUC
Nathan Sarina, Senior Utilities Engineer, ESRB, CPUC
Matthew Yunge, Utilities Engineer, ESRB, CPUC
Andie Biggs, Utilities Engineer, ESRB, CPUC
Stephen Lee, Utilities Engineer, ESRB, CPUC
Anwar Safvi, Utilities Engineer, ESRB, CPUC

Audit of the
Avangrid Renewables LLC
Shiloh Wind Project

Audit Number GA2019-02SH

September 2019

STAFF REPORT

PREPARED BY:
ELECTRIC SAFETY AND RELIABILITY BRANCH
SAFETY AND ENFORCEMENT DIVISION

Table of Contents

I. Introduction

Electricity is a vital resource for the State's economic well-being and the safety of its residents. The California Public Utilities Commission (CPUC) has established standards for logbooks, operation, and maintenance of power plants. CPUC General Order 167 (GO 167) codifies these standards with guidelines for Generating Asset Owners (GAOs). The CPUC Electric Safety and Reliability Branch (ESRB) ensures electric resource adequacy by auditing jurisdictional power plants for compliance with GO 167.

ESRB performed a GO 167 compliance audit of the Shiloh Wind Project (Shiloh or the Plant) that included a site visit from July 15 through July 19, 2019. On June 5, 2019, ESRB notified the Plant of the pending audit and requested pertinent documents for review. During the site visit, ESRB observed plant operations, inspected facilities, interviewed staff and reviewed additional documentation and data. After the site visit, ESRB continued with a review of additional documents. From these activities, ESRB evaluated whether the Plant was in compliance with GO 167. Additionally, ESRB has made recommendations to improve the Plant's programs, procedures, and policies to enhance safety and reliability.

II. Background

Shiloh Wind Project is owned and operated by Avangrid Renewables LLC, a subsidiary of Avangrid and part of the Iberdrola Group. The Plant is located in Birds Landing, an unincorporated community in Solano County. The project consists of 100 General Electric (GE) 1.5 megawatts (MWs) wind turbine generators (WTGs) on tubular steel towers. Scattered over approximately 6,800 acres of leased land, the Plant has a gross generating capacity of 150 MWs. The Plant began commercial operation in March 2006 with a design life of 20 years.

Each WTG tower is supported by a concrete foundation of approximately 48 feet in diameter and seven feet deep. The three-section tubular steel tower ranges in height from 213 to 262 feet. Each of the three blades is approximately 122 feet long with a rotor diameter of 253 feet. Depending on wind speeds, the WTG spins at approximately 11 to 20 revolutions per minute.

The WTG produces power at 575 volts. The electrical output is then stepped up to 34.5 kilovolts (kV) by each of its respective medium voltage transformer at the tower base. Power from the transformer is then transmitted through a series of feeder cables and collector systems to the substation. The substation further steps power up to 230 kV where it interconnects with Pacific Gas & Electric Company (PG&E) grid for transmission. The Plant has a power purchase agreement to sell power to PG&E and other entities including the Modesto Irrigation District, Marin and San Francisco Counties.

III. Conclusions

ESRB identified 10 findings, which are listed in Section IV of the report. Findings are deficiencies that are violations of applicable rules, can adversely affect reliable operation, and present safety hazards to plant personnel.

ESRB made four observations and recommendations, which are listed in Section V of the report. Recommendations are provided to improve plant safety and reliability.

The Plant must respond to these findings and recommendations within 30 days of receipt of this report. The response should include a Corrective Action Plan with an associated timeline for implementation of the corrective actions and preventive measures taken and/or planned in order to resolve the violations, prevent similar deficiencies in the future, and address the recommendations.

IV. Findings Requiring Corrective Action

Finding 1: Shiloh's work order management system is lacking. The Plant does not have a system for prioritizing equipment defects beyond categorizing them as "major" or "minor", where "major" means that the Plant must take an asset out of service in order to perform corrective repair, whereas "minor" means that the Plant can correct the issue when an asset is taken out of service for a different reason (such as an inspection or other corrective maintenance). When an equipment defect is identified and deemed minor, the Plant simply records the defect on its inspection checklist and files it in a cabinet. The Plant does not take further action to assess the defect, create a work order, and prioritize its repair. This practice allows even a minor defect to deteriorate unchecked and possibly result in a catastrophic failure.

Further, ESRB could not easily track outstanding work orders, as Shiloh does not create and electronically track work orders for minor defects. Shiloh's current system makes it difficult to determine how long a defect has occurred, as plant staff would have to go back and review multiple inspection checklists to identify when the issue was first observed and documented. Shiloh must take corrective action to ensure *all* equipment defects are appropriately assessed, prioritized, and repaired.

GO 167, Operation Standard 16: Participation by Operations Personnel in Work Orders states:
"Operations personnel identify potential system and equipment problems and initiate work orders necessary to correct system or equipment problems that may inhibit or prevent plant operations. Operations personnel monitor the progress of work orders affecting operations to ensure timely completion and closeout of the work orders, so that the components and systems are returned to service.

Among other things:

A. *Operations personnel identify problems requiring work orders, and initiate work orders to correct those problems.*
B. *The operations manager or other appropriate operating personnel periodically review work orders that affect operations to ensure timely completion and closeout of the work orders, so that components and systems are returned to service.*
C. *Personnel responsible for prioritizing work orders consult operations personnel to assure that work orders affecting the operations of the plant are properly prioritized.*
D. *Appropriate personnel are trained in and follow procedures applicable to work orders."*

Finding 2: Unreliable network connection impedes Shiloh's operation. ESRB observed that the Plant has a very slow and unreliable Internet/network connection. On multiple occasions, Shiloh staff and ESRB auditors struggled with intermittent service. This is problematic because Shiloh stores many of its company policies and procedures on the Avangrid's network server. An unreliable connection prevents ready access to those crucial documents and records and can impede the Plant's normal operation. Further, Shiloh stores its hazardous materials' safety datasheets online. In an emergency, such as a chemical spill or a lube oil fire, Shiloh needs to

have quick access to those datasheets to decipher any potential health and/or environmental hazards. The Plant must take corrective action to address its unreliable network connection.

GO 167, Operation Standard 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, Operation Standard 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."

Finding 3: Front gate and substation lack security cameras to detect intruders. Shiloh is not manned 24/7 and is only staffed during normal business hours. The front gate, being the main point of entry, is close to the admin building where the Plant stores hazardous materials, replacement parts, tools and equipment essential to safe and reliable operation. Similarly, the substation centralizes many of the Plant's high voltage and critical electrical equipment. The Plant must install security cameras at the front gate and the substation to deter and detect potential intruders and vandals.

GO 167, Operation Standard 21: Plant Security states:
"To ensure safe and continued operations, each GAO provides a prudent level of security for the plant, its personnel, operating information and communications, stepping up security measures when necessary."

GO 167, Operation Standard 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. 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."

Finding 4: Evacuation assembly areas are not marked and identified. Shiloh designates two assembly points (primary and secondary) for workers to gather in emergency evacuations. However, ESRB observed that the primary assembly point, which is at the parking lot in front of the admin building, is not marked and identified. Shiloh must clearly identify the primary assembly point with a permanent sign.

Further, the secondary assembly point, which is offsite and located at the Birds Landing Hunting Preserve, is also not marked and identified. While ESRB understands this is a public site used for gathering, and does not expect Shiloh to erect a sign, the Plant must ensure the location is well-understood and communicated to staff. For example, the Shiloh Site Map as reported to the California Environmental Reporting System (CERS) and provided to ESRB implies that the secondary muster point is, instead, located at the substation (See Figure 1).

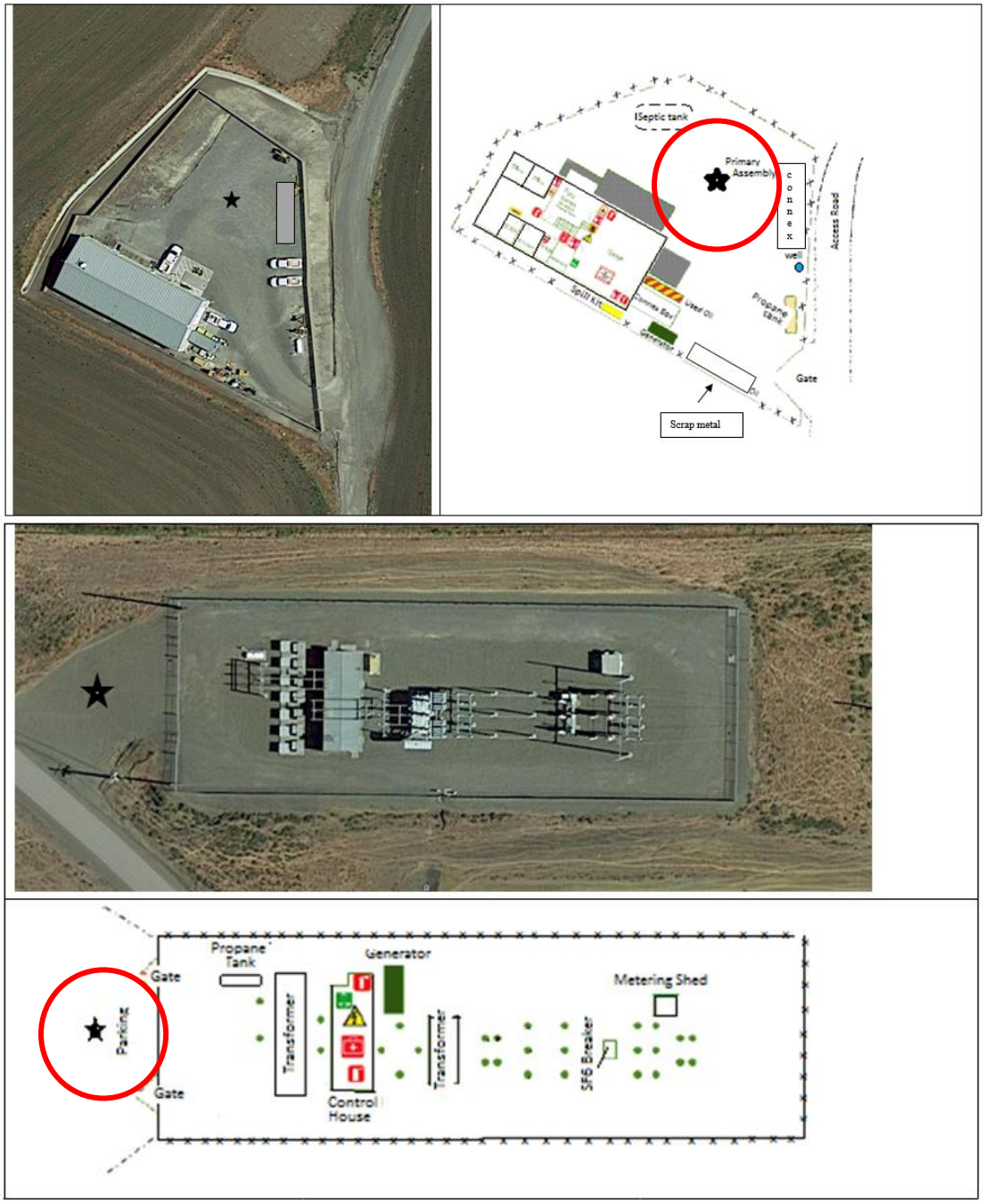

Figure 1: Shiloh Site Map provided to ESRB.

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GO 167, Operation Standard 4: Problem Resolution and Continuing Improvement states:

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Finding 5: Evacuation map is out-of-date. ESRB observed an outdated evacuation map in the shop area by the shower/eyewash station. Contrary to the map as presented in the safety orientation, this map did not include the location of first aid kit and AED as well as the location of flammables and oil storage. The Plant must update this map and ensure that it uses the same map consistently throughout the site and across all plant documents.

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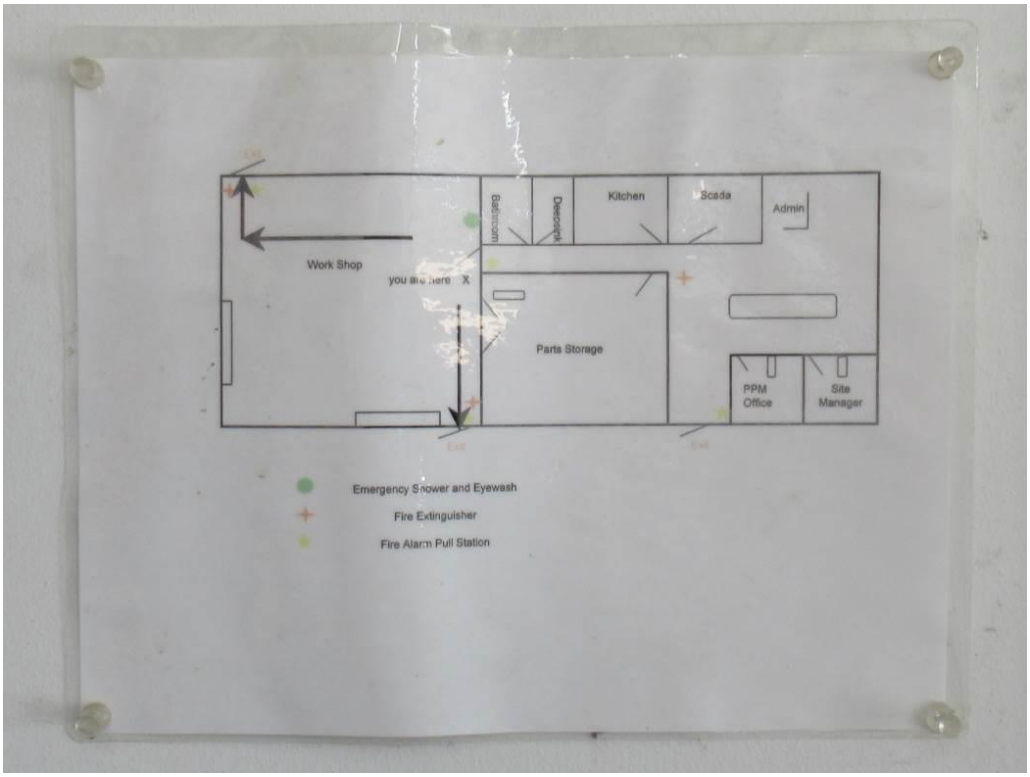

Figure 2: Outdated evacuation map in the shop area.

Finding 6: Hazmat warning sign is missing. Shiloh uses various hazardous materials as part of its normal operation, including flammable lube and hydraulic oil and environmental and

health hazardous chemicals, such as antifreeze, nitrogen, and sulfur hexafluoride. However, ESRB observed no posting of a hazmat warning sign on the roll gates of the shop where the Plant stores these materials. National Fire Protection Association (NFPA) establishes industry consensus standards for fire protection. NFPA 704 is the standard system for identifying hazards of materials for emergency response. The posting of an NFPA placard is a common industry practice to alert first responders of the risks posed by a facility's hazardous materials. This helps emergency workers determine what safety precautions and equipment to use and how best to respond to different scenarios. The Plant must install a hazmat warning sign at the shop, where it stores the bulk of its hazardous materials.

GO 167, Operation Standard 1: Safety states in part:
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Figure 3: Bulk storage of flammable lube and hydraulic oil in the shop.

Finding 7: Hazmat placards for the propane tanks are mismatched. Shiloh maintains a propane tank at the admin building and the substation. While warning placards are conspicuously posted at both locations, ESRB noticed the placard on the tank conveyed a different health hazard warning than its respective placard posted on the chain link fence.

Mismatched placards or signs can confuse workers and first responders and may lead to operational errors or cause response delays. The Plant must take corrective action to reconcile and correct the mismatched signs.

Further, warning placards at the substation were incorrectly installed on the interior side of the chain link fence, rendering them unreadable and ineffective. The Plant must reinstall placards on the fence's exterior such that they are visible and unobstructed.

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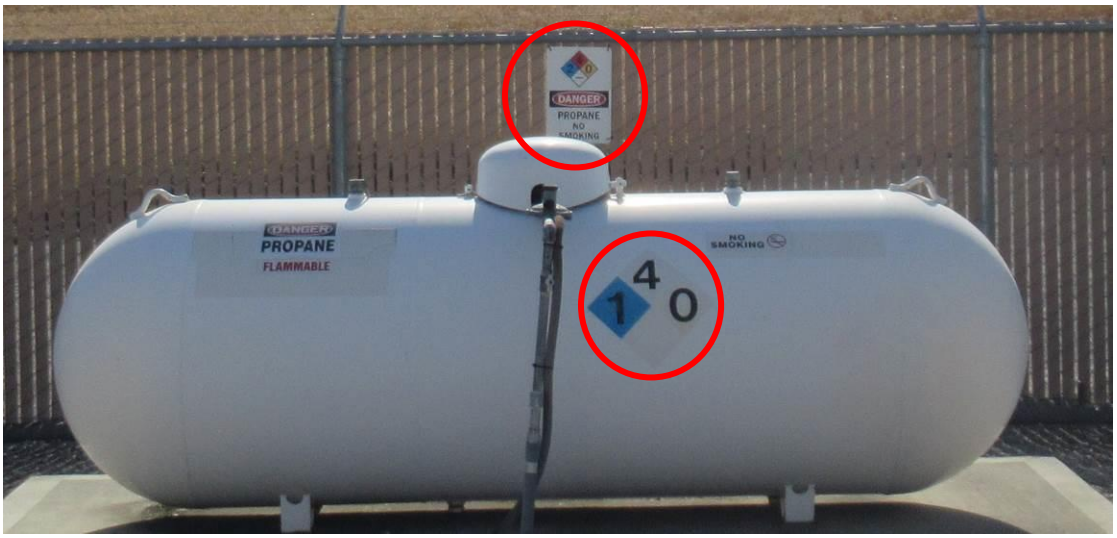

Figure 4: Mismatched placards on the propane tank at the admin building.

Figure 5: Mismatched placards at the substation.

Figure 6: Warning placards visibly obstructed by chain link fence.

Finding 8: Spill kits are not properly inspected. Shiloh maintains multiple spill kits onsite in order to respond quickly in case of a spill. According to plant procedures, Shiloh inspects these spill kits on a monthly basis to ensure all materials within the kits are in working order. However, ESRB noticed that the kit in the shop had wet absorbent socks, and that a bag of absorbent that had holes causing loose absorbent materials to leak. ESRB had learned that the kits were only visually inspected, which as evident in this case, was not sufficient to ensure its contents are in good working order. According to the Plant, the kit was in-use before Avangrid purchased the Plant. The Plant must retrain its workers on how to effectively inspect spill kits.

Further, Shiloh uses a matrix[1] to record its monthly inspections of the spill kits. ESRB found that the matrix was not up-to-date, as the matrix only included one of the spill kits for the admin building. The Plant has at least three other spill kits that were not included in the matrix: one at the substation, and two portable spill kits. The Plant must update this matrix to include all spill kits onsite.

ESRB also found that spill kits did not include an inventory list within each kit. Shiloh must include such lists so that plant staff not only know what to inspect within the spill kits each month, but also know what materials are available to use in case of a spill.

GO 167, Operation Standard 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."

40 CFR 112 Appendix F, Section 1.8.1.2 Response Equipment Inspection states in part:
"*Describe each type of response equipment, checking for the following:*

Response Equipment Checklist
1. Inventory (item and quantity);
2. Storage location;
3. Accessibility (time to access and respond);
4. Operational status/condition;
5. Actual use/testing (last test date and frequency of testing); and
6. Shelf life (present age, expected replacement date)."

[1] Emergency Response Equipment Inspection Matrix

Figure 7: Wet and defective absorbent socks in the spill kit.

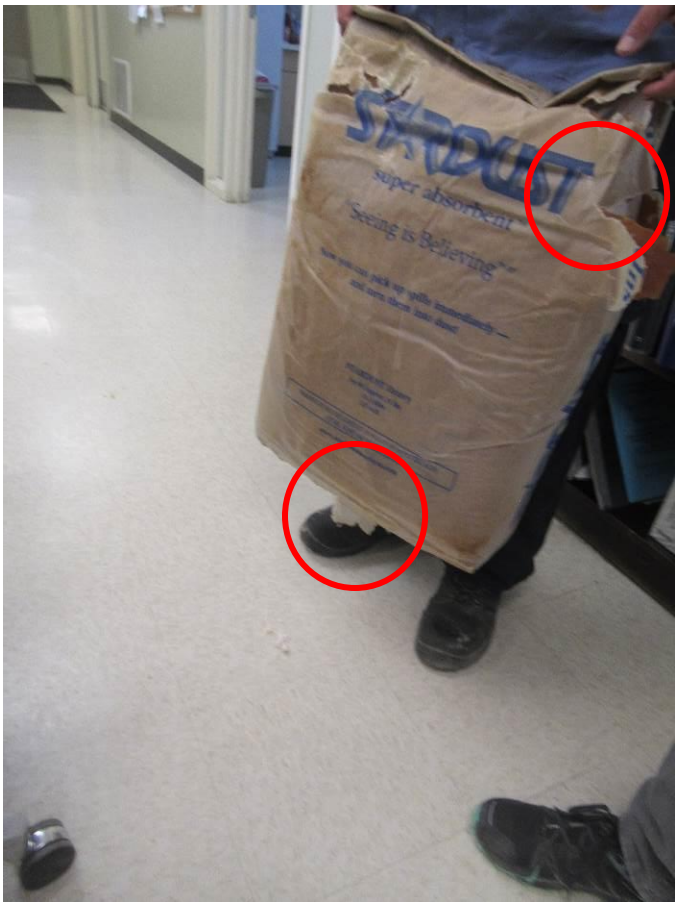

Figure 8: A bag of absorbent had holes causing loose absorbent materials to leak.

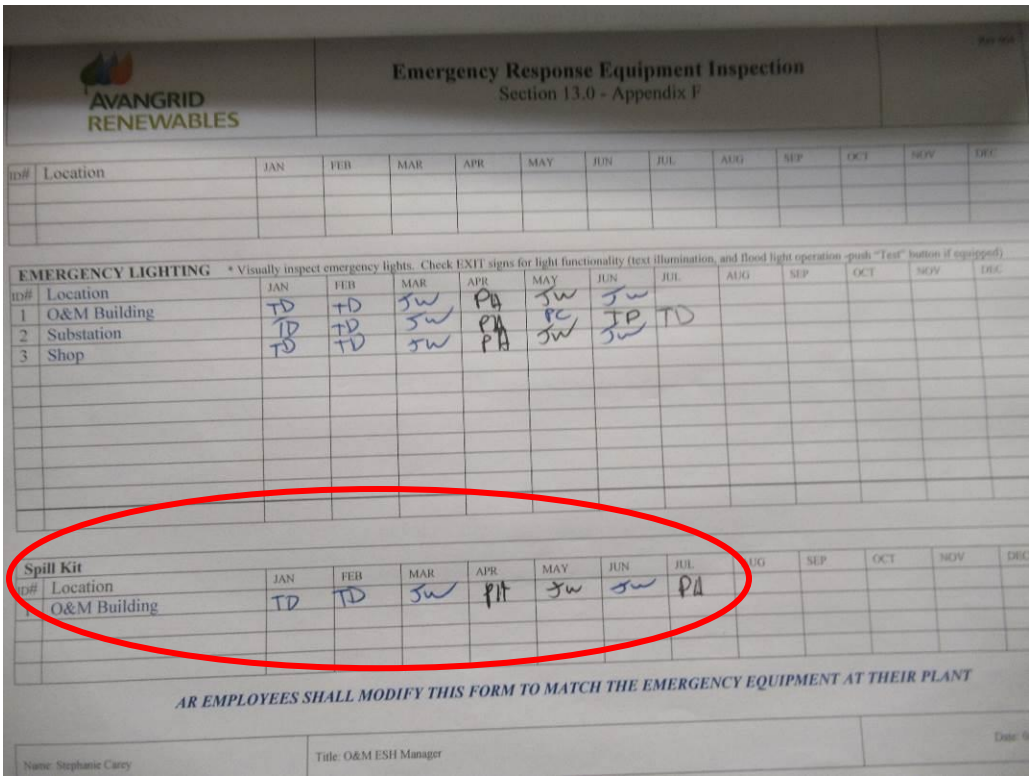

Figure 9: Inspection matrix includes only one of multiple spill kits onsite.

Finding 9: Missing high voltage warning signs. Shiloh has multiple access roads with entry gates for workers to drive to each of its wind turbines. According to Shiloh's land use permit issued by Solano County, each of these access roads needs to have a high voltage warning sign on the entry gate in order to alert anyone who enters that a high voltage hazard exists. ESRB observed that these signs were missing from at least three access gates, and according to the Plant, none of the gates have such a sign. Shiloh must install warning signs on all access gates.

Further, ESRB observed that a similar warning sign is also missing on one of two entrances to the substation control room. One entrance has a sign that alerts and directs worker to call the National Control Center prior to operating any high voltage substation equipment. The Plant must install an identical sign on the second entrance to avoid workers confusion.

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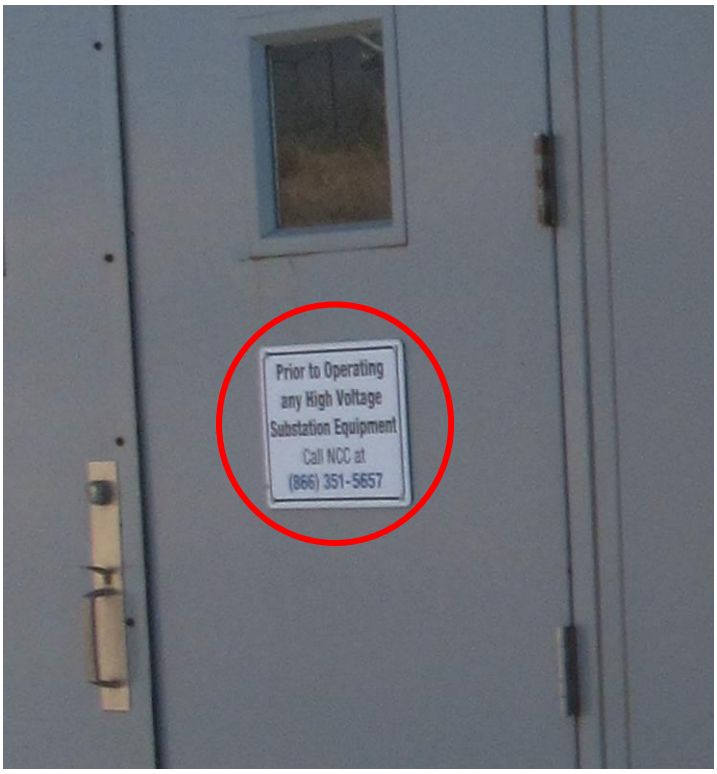

Figure 10: Warning sign on one entrance to the substation control room.

Finding 10: Damaged and illegible sign. ESRB observed a damaged and illegible sign on the perimeter gate of the O&M yard. The sign informs and directs all visitors to sign-in at the main office. Shiloh must replace the defective sign to help reinforce its security protocol.

GO 167, Operation Standard 21: Plant Security states:
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GO 167, Operation Standard 4: Problem Resolution and Continuing Improvement states:
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Figure 11: Damaged and illegible sign on the perimeter gate of the O&M yard.

V. Observations and Recommendations

Observation 1: Failure to follow procedure. ESRB found one instance where the Plant deviated from its lockout tagout (LOTO) procedure. On June 21, 2019, the Plant closed a LOTO permit[2] but failed to document the permit's closure date on its Permit LOTO Logsheet as required by its procedure. Failure to properly document LOTO permits can confuse workers in mistaking a closed for an active LOTO or vice versa. While the Plant corrected the discrepancy during the audit, ESRB recommends the Plant to retrain staff on its LOTO policy to ensure workers understand and follow the procedure.

GO 167, Operation Standard 17: Records of Operation states:

"The GAO assures that data, reports and other records reasonably necessary for ensuring proper operation and monitoring of the generating asset are collected by trained personnel and retained for at least five years, and longer if appropriate."

Shiloh LOTO Procedures Section 5.0 - Lockout Tagout: 6.4 Permit LOTO: Removal states in part:

"6.4.6 Document the "Closed Date" on the Plant LOTO Binder, Permit LOTO Logsheet."

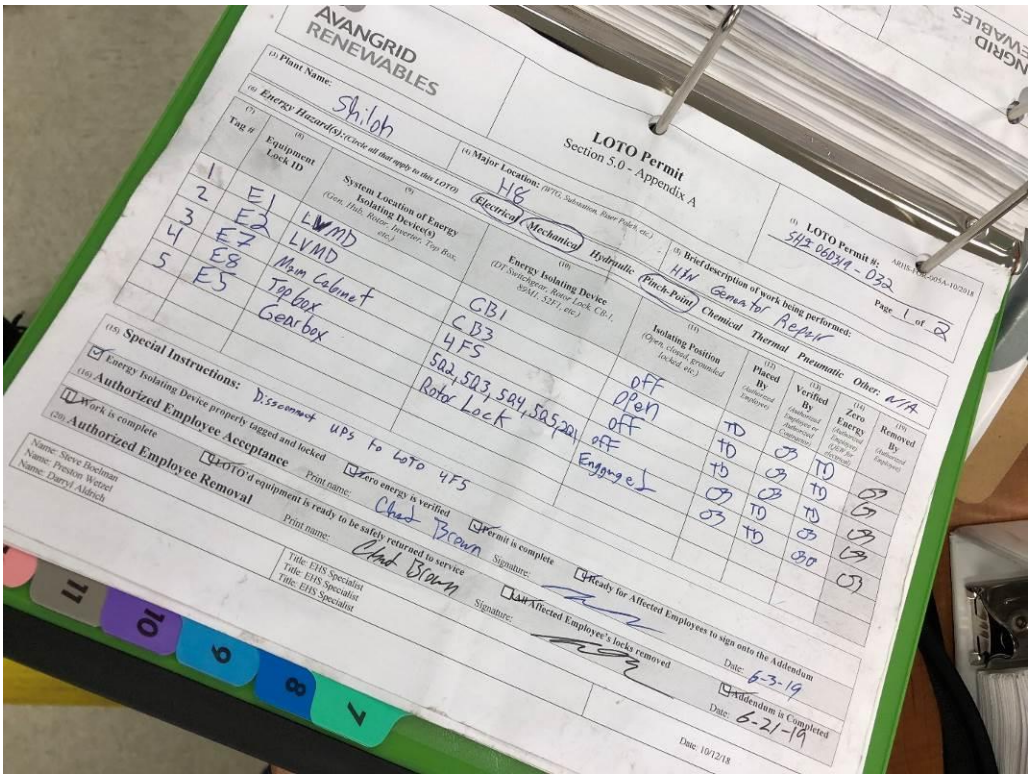

Figure 12: LOTO Permit #SHI060319-032.

[2] LOTO Permit #SHI060319-032

Observation 2: Hardcopies materials safety datasheets (SDS) are not kept onsite. Shiloh uses an online subscription to access its hazardous materials' safety datasheets online. Due to its slow and unreliable Internet/network connection (see Finding 2), Shiloh may not have ready access to those datasheets. In an emergency, such as a chemical spill or a lube oil fire, Shiloh needs to have quick access to those datasheets to decipher any potential health and/or environmental hazards. ESRB recommends the Plant to maintain hardcopies of its SDS onsite until which time the Plant has resolved its network communication issue.

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GO 167, Operation Standard 20: Preparedness for On-Site and Off-Site Emergencies states in part:
"The GAO plans for, prepares for, and responds to reasonably anticipated emergencies on and off the plant site, primarily to protect plant personnel and the public, and secondarily to minimize damage to maintain the reliability and availability of the plant."

Observation 3: Prohibited weapon sign is missing. Shiloh prohibits the use of firearms and/or weapons onsite and explicitly states so in its safety orientation. However, ESRB observed no posting of a prohibited weapons sign anywhere onsite, particularly at the entrance gate, which is the main point of entry onto the site. Contract workers, vendors, and visitors often come onsite. A well-posted and conspicuous sign helps reinforce this company policy. ESRB recommends the Plant to post a prohibited weapon sign at the entrance gate.

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Figure 13: Shiloh's safety orientation explicitly states firearms and weapons are prohibited onsite.

Observation 4: Speed limit sign is missing at the entrance road. Shiloh imposes a site-wide speed limit of 20 miles per hour on all turbine access roads. The entrance road, being the main passageway to the admin building, is subject to most vehicular traffic from contractors, vendors, and visitors, and is where accidents may most likely occur. ESRB recommends the Plant to install a speed limit sign at the entrance road to alert drivers of the imposed speed limit.

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VI. Documents Reviewed

ESRB reviewed the following records and documents:

Category	#	Document
Safety	1	Orientation Program for Visitors and Contractors
	2	Evacuation Procedure
	3	Evacuation Map and Plant Layout
	4	Latest Evacuation Drill Report & Critique
	5	Hazmat Handling Procedure
	6	MSDS for All Hazardous Chemicals
	7	Injury & Illness Prevention Plan (IIPP)
	8	OSHA Form 300 (Injury Log) in last 2 years
	9	OSHA Form 301 (Incident Report) in last 2 years
	10	Fire Protection System Inspection Record
	11	Lockout / Tagout Procedure
	12	Arc Flash Analysis
	13	Confined Space Entry Procedure
	14	Plant Security Measures
	15	Work at Height Procedure and Climb Certifications
Training	16	Safety Training Records
	17	Skill-related Training Records
	18	Certifications for Welders, Forklift & Crane Operators
	19	Hazmat Training and Record
Contractor	20	List of Qualified Contractors
	21	Contractor Selection / Qualification Procedure
	22	Contractor Certification Records
	23	Contractor Monitoring Program
Regulatory	24	Spill Prevention Control Plan (SPCC)
	25	CalARP Risk Management Plan (RMP)
	26	Air Permit (if applicable)
Document	27	Turbine design data
	28	Vendor Manuals
O&M	29	Logbook
	30	List of Backlogged Work Orders (last 4 quarters)
	31	List of Retired Work Orders (last 4 quarters)
	32	Work Order Management Procedure
	33	Computerized Maintenance Management System (Demonstrate Onsite)
	34	All Root Cause Analyses (if any)
	35	Operating Procedures
	36	Monthly Plant Performance Summary/ Detail Reports (last 4 quarters)
	37	Vibration Analysis Reports

	38	Oil Analysis Reports
	39	Substation Inspection Records
	40	Event Response Tracking System (ERTS) Procedure
	41	Test and Inspection of High Voltage Equipment
	42	Reliability Checks Procedure
	43	Maintenance & Inspection Procedures for wind turbines
	44	Maintenance & Inspection Procedures for generators
	45	Maintenance & Inspection Procedures for transformers
	46	Maintenance & Inspection Procedures for gearboxes
	47	Maintenance & Inspection Procedures for other equipment
	48	Maintenance & Inspection Records for wind turbines
	49	Maintenance & Inspection Records for generators
	50	Maintenance & Inspection Records for transformers
	51	Maintenance & Inspection Records for gearboxes
	52	Maintenance & Inspection Records for other equipment
	53	Scada System (Demonstrate Onsite)
	54	Wind Turbine Generation Forecasting
Spare Parts	55	Spare Parts Inventory System
	56	Shelf-life Assessment Report
Management	57	Performance Review Records
	58	Organizational Chart
Instrumentation	59	Instrument Calibration Procedures and Records
Internal Audit	60	Internal Audit Reports within last 5 years