UVM-07
Utility Vegetation Management
Post Work Verification and UVM Program Oversight

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Table of Contents

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1 Purpose

The purpose of this document is to define the Utility Vegetation Management (UVM) Program oversight requirements used to provide reasonable assurance SCE is meeting the applicable Federal and State requirements pertaining to utility vegetation management.

SCE UVM maintains and implements a scheduling process in order to meet Federal and State mandated annual compliance inspection requirements, as applicable. Maintenance work (pre-inspection/prescriptions, pruning and removal) is typically performed by non-SCE resources (contractors). The oversight required in this document is intended to provide several levels of defense-in-depth (DID) strategy to provide reasonable assurance that inspection and maintenance work is being effectively performed.

This document also describes the oversight provided for SCE Summer Readiness activities.

2 Applicability

This document is applicable to the Operating Units (OU's) impacted by Energy Regulatory Compliance Program (ERCP) Compliance Requirements including, but not limited to: Transmission & Distribution

3 Definitions

Refer to the NERC Glossary of Terms, the E&C Shared Services Glossary of Terms (ECSS-02), and UVM Program Glossary of Terms (UVM-16) for any capitalized terms used in this document.

- **Acceptable Quality Level (AQL)** – Is the maximum number of nonconforming products considered acceptable in a particular sample size based on business, financial and safety levels
- **Confidence Level (CL)** – Is the amount of uncertainty considered tolerable. The higher the CL, the more certain the results. With a CL of 95%, one would expect an error one in 20 times. With a CL of 99%, one would expect an error one in 100 times.
- **Confidence Interval/Margin of Error (CI)** – Is the amount of error that is considered tolerable.
- **Judgmental Sampling** – Is a type of nonrandom sample that is selected based on the opinion of an expert. Results obtained from a judgment sample are subject to some degree of bias, due to the frame and population not being identical
- **Random Sampling** – Random sampling is a sampling technique in which each sample has an equal probability of being chosen

- **Population Size** – The total number of items (equipment/assets/people) from which to choose a sample. The sample size doesn't change much for populations larger than 20,000
- **Quality Control** – Typically verifies a product by testing a sample of the product against a specification, standards, or other criteria. Quality control measures are aimed at checking, measuring, or inspecting a sample of one or more product characteristics and evaluating the results against requirements to confirm compliance
- **Quality Assurance** - Typically assesses a process through analysis of objective evidence that supports the program or process for adherence and/or compliance with specific requirements
- **Reasonable Assurance** – A high, but not absolute, level of assurance
- **Sample Size –** This is the minimum recommended size for sampling

4 Detail

4.1 Personnel Qualifications

Personnel performing UVM Post Work Verification shall be qualified in accordance with UVM-11, "Qualification of UVM Senior Specialists".

Contract personnel performing QC inspections for the UVM Program shall be an SCE approved contractor for vegetation management. Additionally, contract personnel performing QC on Tree Risk Assessments for SCE's Hazard Tree Management Plan (HTMP) shall be Certified Arborists with the International Society of Arboriculture.

SCE personnel performing QC inspections for the UVM Program shall have their Quality Program approved by UVM leadership.

SCE personnel performing QA activities shall be qualified in accordance with a SCE approved Quality Assurance Program.

4.2 Sampling Methodology

QC inspections for UVM are based on judgmental sampling and may incorporate 100% inspection in certain High-Risk Areas. The intent of QC inspections is to provide Reasonable Assurance that high quality work is being performed and program requirements are being achieved.

Sampling is typically performed in production and controlled environments. Even under these conditions, there is an inherent risk that some nonconforming products (non-inventoried vegetation) may be introduced into the population. The sampling performed for SCE's UVM program will identify nonconforming conditions for those items subject to QC inspection. However, items not subject to QC inspection may also contain nonconforming conditions.

The volume of SCE circuit mileage for a given inspection category is compared to sampling charts where Confidence Level (CL) and Confidence Interval (CI) are calculated. SCE uses the sampling calculator from https://www.surveysystems.com

4.3 Inspection Sampling for Risk Area and/or Program Type

Compliance Program (DVMP): SCE has approximately 42,000 Distribution circuit miles. SCE's Tree Risk Index (TRI) risk model is applied to sampling for Distribution circuits and was developed using outputs from SCE's Wildfire Risk Reduction Model (WRRM), historic Tree Caused Circuit Interruption (TCCI) data and other VM inventory data. The TRI risk model identifies four risk categories A, B, C & D, with category A being the highest risk. Sampling is performed using the following Confidence Level (CL)/Confidence Interval (CI) levels:

- Category A 99/1% CL/CI
- Category B, C, D 99/2% CL/CI

In addition to the sampling % identified above, QC will further stratify QC mileage targets as follows:

- 75% +/- 5% of mileage for work completed within 60 days of completion confirmation
- 25% +/- 5% of mileage for work completed greater than 60 days after completion confirmation

Compliance Program (TVMP): SCE has approximately 13,000 transmission circuit miles. QC plans to inspect these miles using a CL/CI of 99/5% with a concentration on High Fire circuit miles, when practical. A lower sample of transmission miles is selected for several reasons which include but not limited to: fewer TCCIs are recorded in transmission, greater vegetation to conductor clearances and routine scheduled LiDAR flight patrols for Class A circuits.

Hazard Tree Management Plan (HTMP): SCE's HTMP applies to HFRA only. The minimum levels of QC inspection implemented for HTMP are provided below:

- 99/2% CL/CI for selected population of Risk Scores
- 100% Verification of Remediation

Dead and Dying Trees (D&DT): D&DT applies to HFRA Tier 2 and Tier 3 applicable areas. The minimum levels of QC inspection implemented for DRI is provided below:

- 100% Verification of Remediation

Pole Brushing Oversight: While QC inspectors are performing their inspections in SRA, QC inspectors are asked to look for any poles with equipment installed that do not appear to either: (1) have been brushed cleared to a 10-foot radial clearance around the base of the pole, or (2) do not appear to be recently brushed with regrowth present. QC inspectors are not asked to determine the exemption status of the pole in accordance with Public Resource Code PRC 4292, but to inform the Pole Brushing Manager of a potential noncompliant pole to be investigated and subsequently brush cleared if deemed necessary. QC inspectors shall provide the pole identification number to the Pole Brushing program Manager with an attached photograph.

4.4 Sampling Strategy

Table 1 below identifies the four risk categories and planned circuit miles to be inspected for Distribution. Sampling includes both High Fire (HF) and Non-High Fire (NHF) Areas.

- 100% of Category A High Fire Risk miles (2964) shall be inspected, when practical
- Category B, C & D sample miles for inspection should include a minimum 50% HFRA circuit mileage

Table 1 – Distribution Circuit Mile Inspections

TRI Category	High Fire Miles	Non-High Fire Miles	Total Miles	CL/CI %	Miles Inspected
A	2964	1966	4930	99/1	3803
B	3900	4329	8229	99/2	3747
C	2359	5906	8265		
D	1827	19373	21200		
Total	11050	31573	42623	N/A	7550

There are approximately 13,000 total Transmission miles in SCE's service territory. QC plans to inspect using a CL/CI of 99/5% (approximately 600 miles) with concentration on HF miles, when practical.

Hazard Tree Management Plan (HTMP) – HTMP is a commitment in SCE's Wildfire Mitigation Strategy and SCE has committed to inspect hazard trees adjacent to approximately 330 circuits. Although the HTMP target is circuits, the QC target is based on an estimated tree assessment count factoring in prior years target achievements. To provide reasonable assurance the HTMP assessments are being performed accurately, QC will target to perform approximately 14,000 assessments which result in a CL/CI of 99/1% for a population of 100,000 trees. Actual sampling volume should not fall below a CL/CI of 99/2% (approximately 4,000 trees).

HTMP risk scores range from 0 to 100, and risk scores ≥ 50 typically require remediation. QC will primarily sample assessments where the calculated risk score is between 35 and 49, when practical, and chosen at random within the defined population.

The intent of sampling below the remediation threshold is to provide reasonable assurance that trees below the mitigation threshold are not inadvertently missed for remediation, thus creating potential risk.

4.5 Acceptable Quality Level and Conformance rate

To provide measurement of performance and facilitate trending, the results of QC inspections are communicated using an Acceptable Quality Level (AQL) and Conformance Rate (CR). The AQL for RCD is 100% and the AQL for CCD is 95%.

- An AQL is recommended by the UVM Leadership Team and agreed upon by the assessed work group/organization's management
- The CR is used to assess whether performance is meeting or is below the established AQL
- The CR is determined by the number of nonconforming assets (trees) identified within the circuit mile population compared to the number of assets inspected. An example of how the CR is determined is provided below:
    - If 100 assets are inspected in one month and 19 assets are found nonconforming, the CR is 81%. If the AQL for acceptable performance is determined to be 95% CR, then a CR of 81% falls short of the performance expectation by 14%.

4.6 Defense in Depth Oversight Strategy

UVM work primarily consists of: (1) Pre-inspection; (2) Line clearing (pruning); and (3) Hazard Tree Risk Mitigation. To provide reasonable assurance the UVM Program is implemented appropriately, SCE uses a three-tiered oversight strategy, "defense-in-depth" oversight. The three levels of oversight are as follows:

- Post Work Verification
- Quality Control Inspections
- Quality Assurance Reviews

SCE also evaluates and remediates (as applicable) vegetation management issues identified from: (1) annual transmission patrols performed by qualified transmission Senior Patrolman; (2) distribution overhead detailed inspections; and (3) Summer Readiness programs. These activities are not included as part of the defense-in-depth oversight strategy. Additionally, LiDAR inspections are performed on specific high risk/high fire transmission circuits in accordance with LiDAR procedure UVM-06 which compliments SCE's DID strategy and oversight sampling approach to prevent encroachment.

Post Work Verifications are performed by SCE UVM SSPs and are the initial reviews performed to validate field work accuracy. Details are provided in section 4.7.

Quality Control Inspections are performed by appropriately trained and qualified internal or external entities whose function and organizational reporting is independent to the UVM Operations organization. Quality Control Inspections are intended to provide reasonable assurance of compliance and are typically performed using judgmental sampling with emphasis on the highest risk areas. Details are provided in section 4.8.

Quality Assurance Reviews are performed to provide reasonable assurance the UVM program and processes are designed and implemented effectively. The reviews are performed to assess the design of, and ensure compliance to established UVM policies and procedures, and to provide recommendations for continuous improvement. The reviews are also intended to provide reasonable assurance VM is complying with Federal and State requirements, as applicable, in addition to SCE's VM Wildfire Mitigation Plan commitments. Details are provided in section 4.9.

Separate to the UVM Program, other compliance QA reviews are performed by T&D QA Process and Controls group and by the Corporate Audit Services Division.

4.7 Post Work Verification

4.7.1 Post Work Verification

Post Work Verification is performed as follows:

- Approximately 5% of grid/circuit inventory is reviewed by the SSP for their area of responsibility
  - Errors identified through the review process are communicated to the responsible work crew supervision, and reassigned in the WMS, as applicable
  - Clearance violations are remediated and objective evidence validating remediation is provided to the SSP, or the SSP must field validate
- Review criteria includes, but is not limited to the following:
  - Ensuring clearances required by the Transmission Vegetation Management Plan (TVMP) or Distribution Vegetation Management Plan (DVMP), have been achieved
  - Assessment of any incomplete work submitted by the contractor
  - Appropriate ANSI utility tree pruning criteria
  - Complete and accurate inventory, species, and overall WMS data
  - Ensuring the accuracy of pre-inspections that may have missed trees needing work

Additionally, if training/coaching provided to the pre-inspection or pruning contractors and/or feedback provided after a SSP review fails to yield satisfactory performance, additional controls will be added to the process to correct performance deficiencies.

4.8 Quality Control Inspections

4.8.1 Quality Control Inspections for TVMP and DVMP

- Transmission circuit miles are inspected using a CL/CI of 99/5% and Distribution circuit miles are inspected using the mileage targets of Table 1
  - If significant inspection criteria violations are identified, the QC inspector (or their representative) must provide timely notification to the applicable SSP(s) and QC scheduler for potential scope expansion, feedback to contractor, or other action deemed appropriate
- QC inspection criteria includes, but is not limited to, the following:
  - Ensuring clearances established in the TVMP/DVMP (as applicable) are achieved
  - Complete and accurate inventory, species, identification
  - Appropriate ANSI utility tree pruning criteria
- RCD and CCD clearance violations shall be annotated in the work management system for remediation to achieve the required clearance

4.8.2 Hazard / Reliability Trees

- QC shall perform an independent risk assessment in accordance with the sampling recommendations referenced in section 4.4
  - Risk scoring shall be performed using the latest approved version of the HTMP Assessor Field Guide and Tree Risk Calculator
  - QC shall primarily target assessments, as practical, to risk scores in the range of 35 to 49
- Subject Trees identified as a Hazard or Reliability Tree will also be inspected for the following criteria:
  - Prescription was completed (Prune or Removal)
  - ANSI criteria was met on Prune
  - Mitigation did not impact other trees adjacent to where mitigation was performed
  - Site Conditions are stable

- Upon QC Inspections of Hazard/Reliability Trees, QC Inspectors will review adjacent Subject Trees for inventory accuracy and add any "Missed" Subject Trees to the HTMP inventory for assessment.

4.8.3 Targeted QC Inspections for Negative PI Performance

- VM RPPM produces monthly reports identifying add-on/Scope changes performed by tree trimmers due to poor Pre-Inspector (PI) performance.
- VM Compliance will establish a performance threshold intended to identify outlier PI performance. When the threshold is met, QC will allocate 1-2 QC inspectors to perform targeted QC inspections (performed before any trimming) directly following PI work performed by the respective PI crews to confirm the trends being observed.
- Results of the targeted QC inspections will be shared with VM operations to determine the need for corrective actions being issued to the respective contractor.

4.8.4 QC Scheduling, Inspection and Reporting

- The QC scheduler is responsible for selecting the circuit mileage to be inspected
- The QC scheduler is responsible for selecting Subject, Reliability and/or Hazard Trees to be inspected for HTMP
- QC inspection packages should be provided to the QC inspection contractor by the QC scheduler by the 15th of the month prior to the planned QC inspection
- QC inspections should be performed within 60-90 days of a completed work assignment by contractor
- QC inspection results/reports shall be provided to the QC scheduler for review in a timely manner
  - If significant conditions are identified that require immediate attention, the QC contractor shall notify the applicable SSP(s) of such conditions prior to issuing the subsequent report
  - Noted deficiencies are remediated
  - Performance feedback is provided to the appropriate contractor
  - Reworked conditions are verified for completion
- QC inspection reports are filed in the UVM SharePoint folder
  - Note: QC inspection reports are not Critical Business Records

4.8.5 Inventory Reconciliation

If issues are identified with inventory, the issues shall be provided to, and reconciled by the appropriate pre-inspection contractor, and appropriate records updated in the Work Management System.

The QC inspections are intended to be a validation that SCE's tree inventory is correct.

4.8.6 Summer Readiness/Supplemental Patrols

- Distribution: Operation Santa Ana – SCE SSPs in conjunction with Local Fire Authorities (LFA) perform an inspection of assets/vegetation to ensure no encroachment conditions exist. Identified conditions are scheduled for mitigation by SCE UVM contractors and validation of work completion is performed by the LFA
- Distribution: High Fire Canyon Patrols – These patrols are scheduled and performed by SCE UVM pre-inspection contractors. Identified conditions are logged into a Canyon Patrol log and mitigated by SCE UVM pruning contractors
- Area of Concerns: Weather conditions such as high wind or extended heat during periods of low fuel moisture have greater potential to generate significant fire events if an ignition occurs. Supplemental inspection plans vary year-to-year based on routine inspection schedule overlaps and risk evaluations. Factors for risk identification include Quality Control results, Schedule, Structure types, and Program scopes. These patrols are performed by UVM pre-inspection contractors and SCE SSP's.

4.8.7 Transmission Circuits under FERC jurisdiction

Transmission circuits under FERC jurisdiction (ISO) are inspected annually by SCE's UVM pre-inspection contractors in accordance with FAC-003 R6 requirements. Required mitigations (FAC-003 R7) are completed by SCE's UVM pruning contractors.

SSPs are required to perform 100% circuit verification for circuits identified by the pre-inspectors as zero inventory circuits. SSPs should verify the zero-inventory circuit within 30 days of notification the circuit inspection has been completed.

The SSP review shall be performed on the entire circuit, from source origination to destination (substation to substation) and may be performed using a combination of foot patrol, driving patrol, aerial inspection, or similar. The SSP verification may be performed by a single SSP, or in partnership with other SSP's (District hand-off), to ensure the circuit is zero-inventory.

Documentation reviews for zero inventory circuits shall be documented on the appropriate inspection form and be submitted to RPPM for retention.

4.9 Quality Assurance Reviews

4.9.1 Internal Program Review

An annual internal quality review should be performed to assess the design of and provide reasonable assurance of compliance to established UVM policies and procedures, and to provide recommendations for continuous improvement. The review should include the following areas:

- All UVM Program elements defined in UVM-01 for adherence and improvement opportunities
- Key areas identified in UVM-21, "Internal Controls"
- 3rd Party SME's may be engaged to perform field verification assessment(s) under the direction of the review lead if field engagements are included in the assessment
- Verification of annual QC plan implementation

4.9.2 Compliance Review

Annual QA Compliance reviews are performed by T&D Compliance and Quality Process Controls to provide reasonable assurance of compliance to Federal and State requirements, as applicable. This review includes an assessment of compliance evidence and documentation, and key controls testing.

- Review is intended to identify compliance gaps and improvement opportunities
- Review complies with ERCP-06, and applicable T&D P&C procedures
- Compliance evidence from the prior year is reviewed prior to management's declaration of compliance
- Compliance evidence from the prior year is reviewed to provide assurance to Wildfire Mitigation Plan (WMP) commitments
- Compliance evidence and documentation is reviewed against the applicable regulatory and WMP requirements to assess:
  - Accuracy – Evidence substantiates assertions in the RSAW and/or the RSAW accurately describes the process performed
  - Relevancy – Evidence substantiates all parts of the Requirement
  - Completeness – Evidence is comprehensive and sufficient to demonstrate compliance
- Key controls testing is performed to assess the design and effectiveness of these controls
- Final report/results are provided to UVM Program Owner and other relevant stakeholders

4.10 Annual Quality Control Inspection Plan

An annual QC inspection plan is required to identify the planned strategy for QC inspections that will be performed during the calendar year.

Scope identified in the QC plan may be adjusted to account for any unforeseen schedule issues contingent upon the minimum sampling volume being maintained.

The plan shall be issued at the start of 2Q of the inspection year.

The plan shall be approved by the appropriate UVM senior leadership (Compliance Senior Manager, Operations Senior Manager and Principal Manager).

4.11 Performance Analysis and Trending

Results of QC inspections shall be reviewed monthly and compared to the AQL requirements. Results shall be communicated to vegetation contractors during monthly performance review meetings. Adverse trends may require the implementation of Corrective Actions.

4.12 Records

SSP review records are maintained electronically in the Work Management System.
The annual QC plan and QC reports are maintained in the Vegetation Management SharePoint site.
Electronic and/or hardcopy records shall be retained for 7 years beyond the inspection date.

5 Approvals

Program Manager	Signature	Date
Melanie Jocelyn, Principal Manager	***Melanie Jocelyn*** / Approved by E-mail	2/3/22

6 Revision History

Revision Number	Date	Description of Revision	By	Next Review Date
1	12/21/18	Initial Release for UVM Program	Bill Kotteakos	2019
2	5/17/19	Modified Section 4.7, Updated TSP to SSP	Bill Kotteakos	5/17/20
3	9/1/19	Revised QC Mileage Sample Tables to incorporate REAX Risk Data	Bill Kotteakos	9/1/20
4	4/1/20	Revised QC Mileage Sample Tables and incorporated additional HTMP QC inspection requirements	Bill Kotteakos	4/1/21
5	2/9/22	Updated program sampling requirements and general document refresh for currency	Bill Kotteakos	2/9/23

7 References

External References

- NERC Glossary of Terms

Internal References

- UVM-11, Qualification of UVM Senior Specialists
- UVM-16, UVM Program Glossary of Terms
- ECSS-02, E&C Shared Services Glossary of Terms (ECSS-02)
- ERCP-06, Self-Certification Procedure

8 Distribution and Data Retention

Distribution list:

- UVM Managers
- Impacted ERCP OU Compliance Touchpoints
- E&C PMO
- UVM Quality Control Contractors

9 Key Contacts

UVM Senior Manager, Compliance: Bill Kotteakos, (949) 379-9470