

**PUBLIC ADVOCATES OFFICE DATA REQUEST:
CALADVOCATES-SDGE-2023WMP-13
SDG&E RESPONSE**

**Date Received: April 25, 2023
Date Submitted: April 28, 2023**

GENERAL OBJECTIONS

1. SDG&E objects generally to each request to the extent that it seeks information protected by the attorney-client privilege, the attorney work product doctrine, or any other applicable privilege or evidentiary doctrine. No information protected by such privileges will be knowingly disclosed.

2. SDG&E objects generally to each request that is overly broad and unduly burdensome. As part of this objection, SDG&E objects to discovery requests that seek “all documents” or “each and every document” and similarly worded requests on the grounds that such requests are unreasonably cumulative and duplicative, fail to identify with specificity the information or material sought, and create an unreasonable burden compared to the likelihood of such requests leading to the discovery of admissible evidence. Notwithstanding this objection, SDG&E will produce all relevant, non-privileged information not otherwise objected to that it is able to locate after reasonable inquiry.

3. SDG&E objects generally to each request to the extent that the request is vague, unintelligible, or fails to identify with sufficient particularity the information or documents requested and, thus, is not susceptible to response at this time.

4. SDG&E objects generally to each request that: (1) asks for a legal conclusion to be drawn or legal research to be conducted on the grounds that such requests are not designed to elicit facts and, thus, violate the principles underlying discovery; (2) requires SDG&E to do legal research or perform additional analyses to respond to the request; or (3) seeks access to counsel’s legal research, analyses or theories.

5. SDG&E objects generally to each request to the extent it seeks information or documents that are not reasonably calculated to lead to the discovery of admissible evidence.

6. SDG&E objects generally to each request to the extent that it is unreasonably duplicative or cumulative of other requests.

7. SDG&E objects generally to each request to the extent that it would require SDG&E to search its files for matters of public record such as filings, testimony, transcripts, decisions, orders, reports or other information, whether available in the public domain or through FERC or CPUC sources.

8. SDG&E objects generally to each request to the extent that it seeks information or documents that are not in the possession, custody or control of SDG&E.

9. SDG&E objects generally to each request to the extent that the request would impose an

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undue burden on SDG&E by requiring it to perform studies, analyses or calculations or to create documents that do not currently exist.

10. SDG&E objects generally to each request that calls for information that contains trade secrets, is privileged or otherwise entitled to confidential protection by reference to statutory protection. SDG&E objects to providing such information absent an appropriate protective order.

II. EXPRESS RESERVATIONS

1. No response, objection, limitation or lack thereof, set forth in these responses and objections shall be deemed an admission or representation by SDG&E as to the existence or nonexistence of the requested information or that any such information is relevant or admissible.

2. SDG&E reserves the right to modify or supplement its responses and objections to each request, and the provision of any information pursuant to any request is not a waiver of that right.

3. SDG&E reserves the right to rely, at any time, upon subsequently discovered information.

4. These responses are made solely for the purpose of this proceeding and for no other purpose.

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QUESTION 1

SDG&E reports, on page 148 of its WMP, that work orders are projected to decrease in future years after a large current influx of inspection findings caused primarily by SDG&E's drone inspection program.

- a) Why has SDG&E's drone inspection program led to an unusually large number of new work orders, as referenced above?
- b) What lessons has SDG&E learned about its non-drone inspection practices in comparison to drone programs, considering that the drone program has identified many maintenance needs that had not been previously identified, including 216 emergency items?

RESPONSE 1

SDG&E objects to the request on the grounds set forth in General Objections Nos. 3 and 9. Subject to and without waiving the foregoing objections, SDG&E responds as follows:

- a) As discussed in SDG&E's 2023-2025 WMP Section 8.1.1.3.1, the Drone Investigation, Assessment and Repair (DIAR) Program performed inspections on every HFTD overhead distribution structure between 2019 and 2022. As a result, SDG&E saw an increased rate of DIAR Program findings of about 25 percent compared to approximately 6 percent for ground-based inspections. In general, the drone inspections and imagery collected allowed inspectors to identify the following issues:
 - 1. Issues visible only from above, such as hollowed out pole tops, tracking on crossarms, transformer corrosion (visible only on the lids), and loose hardware that was blocked from view if looking up.
 - 2. Smaller issues harder to see with the naked eye or with binoculars, such as frayed wire or small chips in insulators, that are more easily visible with high resolution imagery than can be enhanced on the computer screen.
 - 3. Issues on poles that are more difficult to access because of terrain or topography.
- b) Non-drone inspections mandated under GO 165 can be supplemented with risk-informed drone inspections. Drone inspections include both a ground-based inspection and an aerial inspection. Inspection teams consist of a qualified inspector and a drone pilot in an effort to capture issues identified better with a drone and those issues that are best observed from the ground. Additionally, unplanned drone inspections can be utilized for operational and/or reliability needs.

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QUESTION 2

SDG&E states that 216 emergency items found by the drone inspection program have been repaired and closed.⁴ For each of these 216 emergency repair tags, please state:

- a) Circuit ID number
- b) Circuit voltage
- c) The date the issue was identified
- d) The date it was resolved
- e) A description of the damage
- f) How the issue was addressed, if applicable

RESPONSE 2

SDG&E objects to the request on the grounds set forth in General Objections Nos. 2 and 9. Subject to and without waiving the foregoing objections, SDG&E responds as follows:

(a) - (e)

See “DIAR Emergency Issues 2019-2022.xlsx” that provide a list of all emergency issues identified through the drone inspection program from 2019-2022. The list includes responses to question 2(a) through (e).

(f)

Please note that for question 2(f), the issues were addressed through a repair or mitigation of the issue described on the data resolved. No further details are readily available without pulling as-built submittals for each issue.

¹ SDG&E WMP, p. 148.

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QUESTION 3

On page 199 of its WMP, SDG&E states that its damage detection models are 86% accurate at detecting damaged infrastructure photographed in drone inspections.

- a) How do human inspectors review SDG&E's damage detection model's damage findings for accuracy?
- b) Is *all* footage from SDG&E's drone inspection program reviewed by human inspectors to verify that the damage detection model did not miss any instances of infrastructure damage?
- c) Please detail SDG&E's protocols for addressing a situation where human inspectors identify errors in the damage detection model's findings.
- d) If the answer to part (b) is yes, how does SDG&E use instances of damage missed by the damage detection models (i.e., false negatives) or flagged as damage when they are not (i.e., false positives) to better train damage detection models?

RESPONSE 3

SDG&E objects to the request on the grounds set forth in General Objections Nos. 2 and 9. Subject to and without waiving the foregoing objections, SDG&E responds as follows:

- a) SDG&E performs quality assurance reviews on all inspections completed as part of its Drone Investigation Assessment and Repair (DIAR) Program. After the Inspector completes the inspection and the results are reviewed by the supervisor, the images and findings are processed through the machine learning models in production. When a model makes a prediction, it is surfaced for review to the supervisor with the predicted damage highlighted on the image. The supervisor can then verify or reject the predicted damage. If the damage is verified, it is added to the inspection report before it is finalized.
- b) Yes, all images are reviewed by human inspectors. In addition, human inspectors are in the field performing ground inspections *with* the drone pilots taking photos of the facility.
- c) See response in part (a) above. If a model finding is rejected by the supervisor, it is used to improve the model for future use. If the supervisor identifies an issue through their inspection of drone imagery that the model later misses, this is also used to improve the model for future use.
- d) Images and inspection findings are used to build, train, and enhance damage detection models that allow Intelligent Image Processing (IIP) technology to process imagery data and improve the quality of machine learning model capabilities.

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QUESTION 4

On page 199 of its WMP, SDG&E states that its damage detection models are 86% accurate at detecting damaged infrastructure photographed in drone inspections.

- a) Please state the basis of the 86% accuracy figure noted above.
- b) For the 14% of results that are not accurate, mentioned above,
 - i. what percentage of these inaccurate results are false negatives?
 - ii. what percentage of these inaccurate results are false positives?
- c) For purposes of estimating the accuracy of the damage detection model, how does SDG&E identify instances where the model produces a false negative result?

RESPONSE 4

- a) Below are the definitions used for the accuracy metric:
 - True Positive (TP): Poles with damage detection found by inspector (or verified by supervisor) and model
 - True Negatives (TN): Poles with no issue detected by model or inspector; Poles with damage written up by inspector that is not in scope of damage detection models
 - False Positives (FP): Poles with damage detection found by model that is rejected by supervisor
 - False Negatives (FN): Poles with a damage identified by inspector that is in scope of damage detection models and not found by model

The below metrics were taken from DIAR Tier 2 (7/7/2021 – 12/12/2022):

Total Poles = 42,804
True Positive Poles = 10,268
True Negative Poles = 26,360
False Positive Poles = 3,334
False Negative Poles = 2,842

Accuracy = $(TP+TN)/(TP+TN+FP+FN) = (10268 + 26360)/(10268 + 26360 + 3334 + 2842) =$
0.86

- b) For the 14% of results that are not accurate, see above for definitions and total results.

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i. % False Negative Poles = (FN)/(TP+TN+FP+FN) = (2,842)/(10268 + 26360 + 3334 + 2842) = **0.07**

ii. % False Positive Poles = (FP)/(TP+TN+FP+FN) = (3,334)/(10268 + 26360 + 3334 + 2842) = **0.08**

c) The damage detection models are used in a Quality Assurance capacity for the drone inspection programs. In this human + machine partnership, a Qualified Inspector first reviews the drone imagery for potential damages and then the damage detection models automatically assess the same set of images to identify damages. When a potential damage is identified by the model, it validated against the inspector’s findings and if it is an “additional” damage not identified by the inspector, it is surfaced for review by the supervisor and added to the report before it is finalized if approved by the supervisor. If a damage is written up by the inspector and is not identified by the model, this is considered a false negative result to be used for improving the model for future use.

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QUESTION 5

Please refer to SDG&E’s reports, on page 148 of its WMP, that open work orders are expected to stabilize as the DIAR Program revisits poles that have been previously inspected by drone.

- a) How did SDG&E incorporate the DIAR program’s infrastructure inspection and assessment results from its beginnings in 2019 through 2022 to improve SDG&E’s model related to probability of failure (PoF) in 2023?
- b) State the basis of how SDG&E arrives at 2250 forecasted **distribution inspection findings** each year in 2023, 2024, and 2025,² in light of the most recent data on distribution inspection findings numbering 7,367.³
- c) Please provide all available analyses, workpapers, studies or reports that support your response to the previous part.
- d) State the basis of how SDG&E arrives at a forecast of **distribution open work orders** numbering 5000 in 2023, 2000 in 2024, and 2000 in 2025,⁴ in light of the most recent data on distribution open work orders numbering 8,865.⁵
- e) Please provide all available analyses, workpapers, studies or reports that support your response to the previous part.

RESPONSE 5

SDG&E objects to the request on the grounds set forth in General Objections Nos. 2, 7 and 9. Subject to and without waiving the foregoing objections, SDG&E responds as follows:

- a) SDG&E DIAR program’s infrastructure inspection and assessment results are incorporated into the probability of failure (PoF) model as the statistical or machine learning models are created based on asset attributes, historical outages, and historical weather conditions.
- b) SDG&E forecasts 2,250 distribution drone inspection findings based on 15% of ~15,000 drone inspections performed each year between 2023-2025. This is an estimate in between the 25% currently observed through the drone inspections from 2021-2022 and the ground inspection find rate of 6%. Since SDG&E has now completed drone inspections of its entire Tier 2 and Tier 3 overhead distribution facilities from 2019-2022, it is anticipated that the find rate will decrease from 25% and trend closer to the previous

² SDG&E WMP, p. 147.

³ SDG&E WMP, p. 147.

⁴ SDG&E WMP, p. 147.

⁵ SDG&E WMP, p. 147.

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find rate of 6%. With the creation of its risk-informed drone inspection approach, SDG&E anticipates a steadier find rate in the future.

- c) Current program efforts are being used to validate this estimate as we do not yet have sufficient statistically significant data to prepare a study or report to substantiate this 15% value. We predict that it will take 2-3 years of implementation of our risk-informed drone inspections following the completion of the entire HFTD drone inspections to validate that 15% estimate.
- d) The estimates of distribution open work orders was specific to drone inspection open work orders as we anticipate the closure of the majority of open work orders found by drone inspections completed in 2019-2022 by 2024 and then closure of open work orders found annually within either 6 or 12 months after the inspections have been completed. So, on average we anticipate that of the 2,250 issues estimated to be found annually, some will be completed in the same calendar year and others will carry over into the following year; hence, a steady state of approximately 2,000 open work orders associated with distribution drone inspections cycling in a 12-month period.
- e) As per the discussion in 5(c), this currently being studied and analyzed as we do not have statistically significant data to prepare a study or report following our completion of drone inspections across the entire HFTD in an approximate 3.5-year period (9/2019-12/2022).

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f) QUESTION 6

SDG&E reports, on page 231 of its WMP, that it has a small percentage of open work orders in HFTDs that are overdue.

- a) Why does SDG&E forecast having overdue open work orders in 2023?
- b) Why does SDG&E forecast having overdue open work orders in 2024?
- c) Why does SDG&E forecast having overdue open work orders in 2025?

RESPONSE 6

SDG&E objects to the request on the grounds set forth in General Objections Nos. 2, 3 and 9. Subject to and without waiving the foregoing objections, SDG&E responds as follows:

a - c) SDG&E defers open work under reasonable circumstances as authorized under GO 95 Rule 18. Because these deferrals inherently remain open past their initial due date for completion, they are considered overdue. A small percentage of work is forecasted to be deferred, and thus overdue, based on historical deferrals.

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QUESTION 7

SDG&E reports, on page 226-227 of its WMP, that its Quality Assurance and Quality Control (QA/QC) of distribution detailed inspections are 100% accurate with zero audit findings in 2022.

Please state the comparable figures (number of audit findings and the accuracy rate) for detailed distribution inspections in:

- a) 2019
- b) 2020
- c) 2021

RESPONSE 7

a-c) For 2019-2021, QA/QC of detailed distribution inspections are 100% accurate with zero audit findings. Because there is a gap in time between the inspection and audit of the inspection, SDG&E does not define any variances in findings as a failure since it is not possible to determine whether the condition was present at the time of inspection. As more imagery is collected with inspections, it may be possible to provide failure information in the future.

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QUESTION 8

Please refer to SDG&E's reports, on page 226-227 of its WMP, that its Quality Assurance and Quality Control (QA/QC) of distribution detailed inspections are 100% accurate with no audit findings in 2022.

- a) Please describe the QA/QC audit process for detailed distribution inspections.
- b) Please provide SDG&E's internal protocols, procedures, or checklists regarding the QA/QC audit process for detailed distribution inspections.
- c) SDG&E describes how construction supervisors perform a field audit of an inspector's work to validate the results of an inspection performed. What percentage of inspections do construction supervisors validate while in the field with inspectors?
- d) SDG&E states that between 0.5 percent and 1.5 percent of completed inspections per inspector are randomly selected and audited. Who performs the 0.5% to 1.5% audits of inspection results?
- e) Why does SDG&E select 0.5% to 1.5% of inspection results to audit? Please explain the reasoning for this proportion.

RESPONSE 8

SDG&E objects to the request on the grounds set forth in General Objections Nos. 2, 7 and 9. Subject to and without waiving the foregoing objections, SDG&E responds as follows:

- a) As stated in SDG&E's 2023-2025 WMP Section 8.1.6.2, QA/QC of distribution detailed inspections is managed by Operations and Engineering managers. Construction supervisors perform the field audit to validate the results of an inspection performed. Annually, between 0.5 percent and 1.5 percent of completed inspections per inspector are randomly selected and audited. Discrepancies identified during an audit are documented in the system of record and training opportunities are addressed real time with inspectors. Should there be a trend in discrepancies found for any given inspector, additional training may be required.
- b) See "ESP 612_Quarterly Audit Standard Practice_04122017 rev.pdf."
- c) Inspections are not validated by construction supervisors while in the field with inspectors. Supervisors perform QA/QC during the next quarter after the inspectors have completed their field inspection.
- d) Construction supervisors perform the field audit to validate the results of an inspection performed.

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- e) 0.5-1.5% represents a reasonable sample size that provides the construction supervisor with an indication of the inspector's performance and quality of work and provides a reasonable number of quality control inspections that can be performed by the construction supervisors within a quarter.

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QUESTION 9

Please describe the QA/QC audit results in 2022 for each type of asset inspections that SDG&E performs (e.g., detailed transmission inspections, routine distribution inspections, etc.).

RESPONSE 9

SDG&E objects to the request on the grounds set forth in General Objections Nos. 2, 3, and 7. Subject to and without waiving the foregoing objections, SDG&E responds as follows:

As stated in SDG&E’s 2023-2025 WMP, 2022 audit results for each inspection program audited are as follows:

Inspection Program being audited	Audit Program Name	Procedure/ Program Documenting QA/QC Activities	Auditor Qualifications**	Sample Size	Type of Audit	2022 Audit Results
All Transmission Inspection Programs	QA/QC of Transmission Inspections (WMP.1191)	Internal Transmission Line Maintenance Practice*	Construction Supervisor	100% of conditions identified during inspection	Field and Desktop	n/a
Distribution Overhead Detailed Inspections (WMP.478)	QA/QC of Distribution Detailed Inspections (WMP.491)	ESP 612	Construction Supervisor	0.5%-1.5% per inspector	Field	100%
Distribution Drone Assessments (WMP.552)	QA/QC of Distribution Drone Assessments (WMP.1192)	DIAR SOP, Data Capture and Assessment Manual	Construction Supervisor	100%	Desktop	100%
Distribution & Transmission Wood Pole Intrusive Inspections (WMP.483 and WMP.1190)	QA/QC of Wood Pole Intrusive Inspections (WMP.1193)	Wood Pole Inspection Audit Procedures	Third party contractor - auditor	10%	Field	88%
Substation Patrol Inspections (WMP.492)	QA/QC of Substation Inspections (WMP.1194)	SOP 510.040	Construction Supervisor	~18 annually	Field	100%

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Transmission: SDG&E does not currently define or track audit results for transmission inspections. A construction supervisor will validate whether conditions identified during inspections are valid or if no further maintenance is required. Discrepancies and lessons learned as a result of transmission audits are addressed and resolved in real time during staff meetings.

Distribution Detailed: Discrepancies identified during an audit are documented in the system of record and training opportunities are addressed real time with inspectors. Should there be a trend in discrepancies found for any given inspector, additional training may be required. There were no audit findings in 2022.

Distribution Drone Assessments: If any discrepancies are identified, the construction supervisor will provide feedback to the inspector during regular team meetings and the inspection findings will be updated prior to finalization. Similarly, if there are any variations between the results of the machine learning model findings and the Inspector's findings, that information will be reviewed and validated by the construction supervisor. Information will be sent back to the construction supervisor and the missed issues will be included in the inspection findings prior to finalization. Lessons learned, as well as updates to inspection requirements are also incorporated into initial and refresher training materials.

Wood Pole Intrusive: A third party is contracted to perform a field audit of the 10 percent of completed inspections for both distribution and transmission structures. The audit field verifies the initial inspection results monthly. Audit findings are recorded in the wood pole inspection management system and shared with program administrators. Results are reviewed and shared at routine monthly meetings with the intrusive inspectors and their leadership. Work is reissued to intrusive inspectors when discrepancies are identified, and corrections are performed within 2 weeks of the finding.

Substation Patrols: The audit program for substation patrol inspections was implemented in the later half of 2022. A construction supervisor documents completion of the audit and notes any deficiencies in the substation maintenance system of record. There were no audit findings in 2022.

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END OF REQUEST