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August 1, 2023 **BY ENERGY SAFETY E-FILING**

Stephen P. Lai
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Office of Energy Infrastructure Safety
California Natural Resources Agency
715 P Street, 20th Floor
Sacramento, CA 95814

Re: **Q2 2023 Spatial and Non-Spatial Data Submissions**
Docket: 2023-QDR

Dear Mr. Lai:

Electrical corporations were requested to provide Geographic Information System (GIS) data in their respective 2019 and 2020 Wildfire Mitigation Plans (WMP) which required significant interpretation and effort to address. Pacific Gas and Electric Company (PG&E) appreciates the efforts of the Office of Energy Infrastructure Safety (Energy Safety) to refine its guidance and provide standardization through the GIS Data Reporting Requirements (GIS Data Standard or Data Guidelines) and Schema released on August 5, 2020, and updated on February 4, 2021 (V2), September 17, 2021 (V2.1), January 14, 2022 (V2.2), December 15, 2022 (V3), and most recently March 17, 2023 (V3.1). Below we provide updates on our Q2 2023 GIS data submission, regulatory developments relating to our GIS data submission, and general challenges and technical limitations relating to this submission.

In addition, we are providing a narrative outlining some improvements we made to our reporting processes for our Q2 2023 non-spatial data submission, which is submitted as part of our Quarterly Data Report (QDR). These changes will increase consistency in our reporting and better align our data with our peers. We also provide a description of the challenges and technical limitations in our non-spatial data.

Q2 2023 Spatial Data Submission Updates

In Q2 2023, PG&E further improved the alignment of the data in the Spatial Quarterly Data Report (SQDR) and the Quarterly Data Report. PG&E integrated four net new WMP Initiative datasets into the Q2 2023 submission. This required working sessions across business and technical SMEs, transformation of data to fit the SQDR requirements, and implementation of quality control techniques. These new datasets are as follows:

1. System Hardening - Transmission Shunt Splices – WMP Section 8.1.2.5.1 / Utility Initiative Tracking ID GH-06;
2. Fall-in Mitigation (Tree Removal) – WMP Section 8.2.3.4 / Utility Initiative Tracking ID VM-04;
3. Line Sensor Installations – WMP Section 8.3.3.1 / Utility Initiative Tracking ID SA-02; and
4. Engagement with Access and Functional Needs Populations (Portable Batteries) – WMP Section 8.5.3 / Utility Initiative Tracking ID PS-06.

PG&E also incorporated net new data outside of WMP initiatives, including:

1. Other Power Line Connection Location feature class with data representing transmission line interties to other corporations[1];
2. Greased and Operating Voltage fields in the Transmission Line feature class;
3. Construction Grade field in the Support Structure feature class; and
4. Population Impact field in the Critical Facilities feature class.[2]

Furthermore, PG&E made enhancements to the Critical Facility feature class by accessing the source data used for the Backup Power, Backup Type, and Backup Capacity fields. This resulted in the inclusion of additional records in this submission. Integration of these additional data into our SQDR in support of driving quality improvements to progress Data Guideline requirements required working sessions with members of our transmission and distribution asset strategy teams to make reporting assumptions applying sound judgment and by joining in new data sources to our schema. For example, our pole loading database was aligned with GIS support structure tables to bring in the Construction Grade field and US Census data was referenced to derive Population Impact.

To further progress alignment across our spatial and tabular WMP data reports, PG&E leveraged our enterprise data platform, Palantir Foundry, to produce Tables 5 and 6 of Energy Safety's QDR report from data from the final SQDR Risk Event feature classes. Previously, these fields/tables were produced independently from one another because each had its own distinct and individual guidelines. This resulted in parts of each report being created at slightly different points in time and subsequently having varying record outputs for similar data types. For example, WMP Initiative data is dynamic and can evolve each day as more information is reviewed, entered in, or improved upon in its source system. Historically, Foundry was utilized to support creation of complex data entity relationships solely for the SQDR per Energy Safety's requirements, not the tabular QDR. However, with both reports governed by one set of requirements (i.e., Data Guidelines), PG&E focused efforts on automating the QDR using the final Feature Class data from the SQDR. This enhanced approach supports data consistency between the tabular and spatial reports where data overlap exists. PG&E will continue

[1] Spatial reporting inclusions for the introduced Transmission Line intertie dataset involving other corporations will continue to be improved over time as additional information is cataloged.
[2] Please see the Q2 2023 Status Report deliverable's availability explanations for additional information relevant to the inclusion of these fields.

automating more of the QDR tables using Foundry and leveraging the spatial data to continue to progress internal data consistency.

PG&E automated three additional feature classes in Foundry for the SQDR in support of the Q2 2023 submission: Switchgear, Red Flag Warning Day, and High Wind Warning Day. Incorporating more feature classes in Foundry for automation reduces SME burden, promotes consistency in reporting, and supports the data flow between the different feature classes as intended in Energy Safety's schemas. Data quality for the SQDR submission also subsequently improved with Foundry dataset integration since streamlined quality checks run on each dataset which checks for instances where Data Guidelines instructions are not followed. Then, any discovered cases are addressed.

To provide greater transparency for our stakeholders, PG&E is making available for download a non-confidential version of the Spatial Quarterly Data Report from our Wildfire Mitigation Plan webpage.[3] This non-confidential version of the Spatial Quarterly Data Report supports the public interest by permitting access to information to review, analyze, and verify the components of our Wildfire Mitigation Plan and its effectiveness while protecting critical data provided to Energy Safety as part of the Data Guideline requirements. PG&E requests that Energy Safety inform third parties interested in the quarterly reports that this information is directly available from the electrical corporations. Each electrical corporation has different WMP Initiatives and as such, there is no single confidentiality designation that can unilaterally be applied. For example, PG&E's WMP initiative programs have included: expulsion fuse replacements, SCADA commission sectionalizing device installation, motorized switch operator (MSO) replacements, fuse saver installation, and other critical equipment. The above equipment is either remotely operable, and/or responsible for real-time operation of the electric system, and associated with operation and control of the critical bulk electric system (BES) facilities that protected under the North American Electric Reliability Corporation's Critical Infrastructure Protection ("NERC CIP").

Q2 2023 Regulatory Developments Relating to Spatial Data Submission

On May 30, 2023, Energy Safety hosted its second quarterly data check-in this year with the electrical corporations to discuss confidentiality and Red Flag Warning Day data. This check-in allowed electrical corporations the opportunity to present the importance of protecting confidential data and provide examples of how data, which would seem non-confidential, can become confidential when displayed spatially.[4] PG&E appreciates these quarterly check-ins

[3] *See* (https://www.pge.com/en_US/safety/emergency-preparedness/natural-disaster/wildfires/wildfire-mitigation-plan.page#:~:text=The%202023-2025%20WMP%20addresses%20PG%26E%E2%80%99s%20wildfire%20safety%20programs,and%20containing%20the%20customer%20impact%20of%20EPSS%2FPSPS%20events).

[4] For example, if the feature class Unplanned Outages is released, a bad actor would know the customer impacts such as how many customers were de-energized, for how long it took to restore the outage, and other companies impacted. Compiling this information would help a bad- actor target specific transmission lines and/ related assets. On single customer outage impacts, showing the outage location spatially, enables a bad actor the ability to identify the customer with Google Earth and County records.

between Energy Safety and the electrical corporations as it allows for shared understanding around common reporting gaps, technical limitations, data availability, or other complexities to be understood.

General Challenges and Technical Limitations Relating to Spatial Data Submission

PG&E reiterates the general challenges and technical limitations that have been outlined in previous cover letters and in our submitted GIS Data Standard versioning change comments. PG&E's submissions of the requested Status Report and Data Submission (collectively referred to as "Spatial Quarterly Data Report, SQDR, or Spatial QDR submission") are not fully complete as we do not have all the requested data and do not have all the data in the format requested.

Closing reporting gaps will largely require more involved operational and technological changes and a significant investment of resources and time to collect, curate, and organize the Spatial QDR submissions on a recurring basis. This would require several large-scale, multi-year projects[5] with significant resourcing and may come at increased cost to customers. This would also require reprioritizing resources away from other important wildfire mitigation related work. Additionally, the evolving nature of the Data Guidelines creates complexities around prioritization of efforts to address reporting gaps, especially given that a future version change may modify or remove certain requirements.

Given the estimated level of effort required to meet the standard, regular collaboration with Energy Safety is needed to align on expectations, the prioritization of omitted data, technical feasibility issues, and shape modifications to the schema. PG&E recommends that efforts to close the remaining gaps be approached in a phased manner and with collaboration with electrical corporations based on value of the data to Energy Safety's objectives and utility business operations.

PG&E is concerned that there is insufficient time to produce spatial quarterly data at the scale required by the Data Guidelines. [6] Additionally, some of the inputs in the submission report necessarily reflect preliminary estimates and may not reflect final results. For example, 'Planned Initiative' data reflects forecasts that are subject to change based on operational developments and work recently completed may not be fully mapped in our GIS source systems given post construction QA/QC processes. Likewise, Risk Events are often still under investigation and subject to changing data as more information is reviewed.

PG&E's existing data and system architecture were independently developed over decades to address specific operational uses. As a result, there are significant challenges to accessing and aligning data to meet Energy Safety's GIS Data Standard. The various data requested exist across multiple systems and in the current state require significant time and resources to manually align datasets to the Spatial QDR schemas and extract and format the data.

[5] As an example, in the Other Power Line Connection Location feature class, we do not collect much of the information being requested regarding the other line information (e.g., OtherConductorMaterial) for private line owners. We do not keep record of customer owned facilities and views private or customer line owners as separately accountable to compliance with electric line regulations. Collecting this information would require considerable support and coordination with private owners.

[6] PG&E's submissions includes between 12-16 million records, providing limited time to collect, curate, transform, perform antivirus scanning, and submit the data in a file-geodatabase (FGDB) format.

Many of the resources who curate the data are simultaneously involved in core operations work, including emergency response and Public Safety Power Shutoff (PSPS) readiness.

Though our alignments of the Spatial Quarterly Data Report and the tabular Quarterly Data Report have progressed significantly, there are technical limitations to fully align data in certain circumstances. Data included in the spatial Submission must meet specific technical criteria for inclusion, including the ability to transform data into Energy Safety's schema and represent geospatially. Tabular reports such as the QDR are not subject to these requirements which can result in differentials across reports. In addition, each report contains: (i) differentials in technical and schematic requirements; (ii) differentials in timing of data readiness; and (iii) differentials in data types reported on. This is further described through our Comment on Draft GIS Data Standard V2.2.[7]

PG&E understands Energy Safety is using data included in the Spatial QDR submission to inform efforts related to their Compliance Division field inspections. While many use limitations, assumptions and definitions for data submitted are described via our metadata, additional complexities occur when combining distinct datasets for analyses or operations. These complexities can lead to misunderstandings and/or conflicting results when assessing data submitted against field inspection findings. In addition, timing differentials between collection of initiative data and the population of said data into a geospatial format/database (GIS) due to the processes needed to document data, verify work performance, and update (map) geospatial records. Until a project is completed and mapped, detailed information remains in the design systems and paper job packages.

Once data is mapped in PG&E's GIS systems, it can be formatted to meet the requirements of Energy Safety's File Geodatabase schema and included in our Spatial QDR Submissions. Thus, a job may be visible in the field, but will not be present in our submission until these processes are completed. PG&E's Spatial QDR submissions represent the best available data that can feasibly be aligned with Energy Safety reporting requirements. PG&E welcomes additional working sessions with Energy Safety to better understand its intended use of data included in our submissions and provide feedback regarding various applications and/or potential limitations.

General Challenges and Technical Limitations Relating to Non-Spatial Data Submission (QDR)

The non-spatial data submission is subject to the changes and limitations outlined below, as well to the limitations set out in note format in the QDR spreadsheet itself.

<u>Expansion of Q2 QDR Data</u>

A pilot automation project was implemented for Table 1, 5 and 5 that utilizes one dataset for both spatial and non-spatial data. This will decrease discrepancies and produce increasingly

[7] *See* PG&E Comment on Draft GIS Data Reporting Standard Version 2.2 (Dec. 27, 2021).

consistent data. Each quarter we plan to expand this project to additional portions of this submission.

Additionally, Table 2 was refined to provide more consistent data related to our asset tags. Specifically, we created a formal definition of the filter criteria for what data should be included in our reporting and automated this data extract in our Foundry database. This process was then formally documented to ensure future consistency. We also applied this new process to our past asset tag data in Table 2, which provided updated numbers to reflect this change, but which will ensure consistency in the data. This same data extract and update was then applied to Table 13, where the asset tag data also appears.

In Table 10, we converted the unit of reporting of SAIDI metrics to minutes to align with the other IOUs. This change is also reflected in the data from previous quarters to ensure consistency.

Existing Data Issues and Limitations

Starting with the Q1 2022 submission, PG&E began using 2020 census data and this more recent data has impacted the Urban, Rural, and Highly Rural layers, and may cause discrepancies when comparing this data to previous years. Previously, these layers were based on 2010 census data.

For the Access and Functional Needs (AFN) customer data, prior to Q4 2022, customers belonging to the AFN population dataset are based on Medical Baseline Customers only and do not reflect the revision to the AFN definition from the 2021 WMP guidelines. This is the result of a system limitation of the data within PG&E's various systems that are not currently connected to the enterprise GIS database. However, as of our Q4 submission, the data reflects to the revised AFN definition.

Table 7 of the QDR seeks information regarding the current baseline state of our High Fire Threat District (HFTD) and non-HFTD service territory, as located in urban versus rural versus highly rural areas and includes a subset of data for the Wildland-Urban Interface (WUI). WUI is defined as areas where homes are built near or among lands prone to wildland fires. We identify WUI areas within PG&E's service territory based upon data provided by the University of Wisconsin-Madison SILVIS Lab. As of Q3 2022, we received, and began using, the latest WUI layers data which provide the most recent available data which is from 2020.

Finally, it is important to remember that, given the real-time dynamic nature of our GIS system, the data provided in the QDR is only a view of a specific moment in time and will continue to change as our system evolves in the coming months and years.

Conclusion

PG&E continues to improve our data quantity and quality on a quarterly basis to comply with the Data Guidelines. However, additional enhancement opportunities will largely require more involved operational and technological changes, and a significant investment of resources and time to collect, curate, and organize the submissions on a recurring basis. Given the estimated level of effort required to meet the standard, regular collaboration with Energy Safety

is needed to align on expectations, prioritization of data and information, technical feasibility issues, and help shape modifications to the schemas. PG&E appreciates the May 30, 2023, Technical Workshop between Energy Safety and the electrical corporations. PG&E looks forward to the upcoming Quarterly Technical Workshops to help drive priorities, shape schema modifications, and facilitate future data submissions.

APPENDIX:

HISTORICAL SUBMISSION UPDATES AND REGULATORY DEVELOPMENTS

Q1 2023 Submission Updates

- Continued to progress our adoption of Version 3.1 of the Data Guidelines. This included conducting over 30 working sessions to review requirements, assessing the levels of effort needed to adopt new requirements, and implementing more than 700 data changes. Adopting changes applied to Version 3.1 required approximately 7,200 hours across over 50 resources.
- Provided partial data for more than 95% of all new required fields in our submission.
- Drove efforts to ensure that all WMP initiatives, with relevant completed jobs to report against in Q1 2023, were included in the submission.
- PG&E also incorporated, for the first time, the 'EstimatedAge' field into the Support Structure Asset Point feature class. This was done by leveraging the pole installation year estimation component of the support structure equipment failure model which was created for internal purposes to improve wildfire risk and public safety risk modeling.

Q1 2023 Regulatory Developments

- Data Guidelines V3.1 released on March 17, 2023.
- Energy Safety hosted its first quarterly data check-in for 2023 with the electrical corporations to discuss the newly adopted Version 3.1 of the Data Guidelines. PG&E also shared that our wildfire risk model for 2023 was still in progress with a target internal draft date of April 30, 2023, so the newly added 'Ignition Risk', 'PSPS Risk', and 'Overall Utility Risk' schema fields would be using last year's model for the Q1 2023 submission. Similarly, PG&E's 2022 and 2023 models were not designed calculate risks as described in Energy Safety's new version 3.1 Data Guidelines.

Q4 2022 Submission Updates

- Conducted over 30 working sessions regarding the new V.3 Data Guideline requirements to assess the level of effort needed to implement them. Several cross-functional teams were involved in these working sessions to collaborate, review, and identify impacts to existing data pipelines and the feasibility of incorporating new fields or modifying existing ones, including: GIS analytics, information technology (IT), regulatory, legal, and various subject matter experts for the assets, Public Safety Power Shutoff (PSPS) /Risk events, and initiatives depending on the feature class being assessed.
- PG&E incorporated the AiLogID field into the 3.5.4.2 Grid Hardening Log initiative dataset for the SCADA Recloser Installation program.
- Continued pursuing means to align the GIS Data Standard (Spatial QDR) and the Quarterly Initiative Update (QIU) by creating a joint reporting tracker prototype with the goal of ensuring that the same initiative program leads provide the same progress completion unit counts for both quarterly reports. These data governance efforts will help support consistency in reporting.

Q4 2022 Regulatory Developments

- Energy Safety released the draft GIS Data Standard V3 on October 14, 2022. Public comments regarding the draft guidelines were submitted on November 17, 2022, and the

final version was adopted December 15, 2022. Version 3 has necessitated more than 700 data changes. Based on previous version implementations, we estimate that implementing Version 3 will require approximately 1,500 hours across over 50 resources.[8] Implementing these requirements will involve collecting and curating data, updating transformation logic, creating lookup tables and relationships between schemas, and more.

- On December 20, 2022, Energy Safety hosted its fourth quarterly data check-in this year with the electrical corporations to discuss the newly adopted Version 3. This meeting allowed electrical corporations the opportunity to raise any questions, suggestions, or general comments. PG&E requested that future utility and Energy Safety check-ins focus on common reporting gaps found in each feature dataset, so that electrical corporations' technical limitations, data availability, or other complexities can be understood. This collaboration with Energy Safety is needed to align on expectations, prioritization of data, technical feasibility issues, shape modifications to schemas, and will assist in more consistent data applications across utility submissions.

Q3 2022 Submission Updates

- PG&E incorporated 8 new WMP initiative programs, enhanced quality, and expanded use limitations and definitions in our metadata for our spatial quarterly data reporting.
    - New programs included:
        - Early Fault Detection (EFD) Technology – WMP Section 7.3.2.2.3;
        - Generation for PSPS Mitigation – Temporary Distribution Microgrids – WMP Section 7.3.3.11.1 C;
        - Undergrounding of Electric Lines and / or Equipment (*"10K" Initiative*) – WMP Section 7.3.3.16;
        - HFTD/HFRA Open Tag Reduction – Distribution – WMP Section 7.3.4.17;
        - HFTD/HFRA Open Tag Reduction – Transmission – WMP Section 7.3.4.17;
        - Updates to Grid Topology to Minimize Risk of Ignition in HFTDs – Remote Grid – WMP Section 7.3.3.17.5;
        - Infrared Inspections of Distribution Electric Lines & Equipment – WMP Section 7.3.4.4; and
        - Pole Clearing in State Responsibility Areas – WMP Section 7.3.5.2.
- Incorporated, for the first time, grid hardening photos of completed projects for select initiatives: SCADA Recloser Equipment Installation and Fuse Saver Installation through manually assessing an array of post-installation photos for individual projects and selecting the best available photo.
- Proactively enhanced data quality by bringing in over 87% more CircuitID values from what was previously omitted in the 3.1.2 Connection Device feature class through technical working sessions with subject matter experts and GIS analysts create a lookup table.

[8] This estimate is based off of the historical time needed to adopt the previous Data Standard version requirements.

- Gathered and updated metadata information for all 8 newly included WMP initiatives and for the 3.5.2 Vegetation Management Projects.

Q3 2022 Regulatory Developments

- On August 16, 2022, Energy Safety hosted their third quarterly data check-in this year with electrical corporations to align on key issues, document feedback, and provide guidance, where applicable on compliance reporting. This discussion focused on how best to show one-to-many relationships between structures, circuits, substations, and other assets. The working session concluded that an asset relate table would provide benefit in depicting complex one-to-many asset relationships.

Q2 2022 Submission Updates

- PG&E incorporated 9 new WMP initiative programs, enhanced quality, and expanded use limitations and definitions in our metadata for our spatial quarterly data reporting.
    - New programs included:
        - LiDAR Ground Inspections Distribution - WMP Section 7.3.5.7;
        - Install Settings on Distribution Line Devices EPSS - WMP Section 7.3.6.8;
        - EPSS Reliability Improvements - WMP Section 7.3.6.8;
        - SCADA Reclosure Installation - WMP Section 7.3.3.9.1;
        - Stakeholder Cooperation and Community Engagement - WMP Section 7.3.10.1;
        - Rincon Transformer Fuse Replacement - WMP Section 7.3.3.11.2;
        - Emergency Back-up Generation - WMP Section 7.3.3.11.3;
        - Butte County Rebuild (Undergrounding) - WMP Section 7.3.3.17.6; and
        - Line Sensor Installation - WMP Section 7.3.2.2.5.
- Developed Stakeholder Community Engagement and Butte County Rebuild Undergrounding initiative data in Palantir Foundry to enable automation of joins across individual data points to package and geospatially represent it through polygon or line dimensions.
- Proactively enhanced data quality by expanding the descriptors in the 'WMPInitiativeActivity' field for the System Hardening Distribution program by adding four additional hybrid activity descriptors: (1) Hybrid project: Covered conductor installation and undergrounding of electric lines and/or equipment; (2) Hybrid project: Removal and retirement of OH conductor and undergrounding of electric lines and/or equipment; (3) Hybrid project: Covered conductor installation and removal and retirement of OH conductor; and (4) Hybrid project: Covered conductor installation, removal and retirement of OH conductor, and undergrounding of electric lines and/or equipment.
- Collected and updated existing metadata information for, but not limited to, 3.1.4 Lightning Arrester, 3.4.2 Wire Down Event, 3.5.1 Vegetation Inspections, 3.5.2 Vegetation Management Projects, 3.5.3 Asset Inspections, and 3.5.4 Grid Hardening. For example, in the 3.5.3.2 and 3.5.3.3 Asset Inspection Log and Point, PG&E clarifies that asset inspection data in the Q2 submission is better aligned to the Quarterly Initiative Update as both reports now reflect inspections that took place in High Fire Risk Areas (HFRAs) or High Fire Threat Districts (HFTDs).

Q2 2022 Regulatory Developments

- On May 17, 2022, Energy Safety hosted their second quarterly data check-in this year with electrical corporations to align on key issues, document feedback, and provide guidance, where applicable on compliance reporting. Much of the feedback raised from the electrical corporations during the working session were topics reiterated from February's quarterly check-in. Additionally, Energy Safety acknowledged responses are underway to provide guidance to PG&E against the discussion topics shared on March 1, 2022.
- Energy Safety also presented their Geographical Information System (GIS) Data Standard Version 2.2 Guidelines for adoption. PG&E provided additional reply comments for this version of the GIS Data Standard on June 8, 2022.[9] Comments outlined technical challenges and urged Energy Safety to employ a phased approach with clear prioritization for closing outstanding requirement gaps.

Q1 2022 Submission Updates

- PG&E incorporated 10 new WMP initiatives programs, 3 new field attributes, and enhanced quality in the metadata and in several existing fields in our spatial quarterly data reporting.
    - New programs included:
        - System Hardening Transmission – WMP Section 7.3.3.17.2;
        - Fuse Saver (Single Phase Reclosers) Installations – WMP Section 7.3.3.9.2;
        - Defensible Space Inspections on Distribution Substation – WMP Section 7.3.5.17.1;
        - Defensible Space Inspections on Transmission Substation – WMP Section 7.3.5.17.2;
        - Defensible Space Inspections on Hydroelectric Substations and Powerhouses – WMP Section 7.3.5.17.3;
        - Utility Defensible Space – WMP Section 7.3.5.20;
        - High-Definition Camera Installations – WMP Section 7.3.2.1.4;
        - Weather Station Installations and Optimizations – WMP Section 7.3.2.1.3;
        - LiDAR Routine Vegetation Transmission Inspections – WMP Section 7.3.5.8; and
        - Distribution Fault Anticipators (DFA) Installations – WMP Section 7.3.2.2.3.
    - Net new fields include:
        - Substation Rating – 3.1.6 Substation Feature Class; and
        - Conductor Overall Diameter and Conductor Ampacity – 3.2.3 Secondary Distribution Line Feature Class.
    - Enhanced fields include:

[9] *See* PG&E Comment on OEIS Geographic Information Systems Data Standard, Version 2.2 (June 8, 2022).

    - Exempt Status – 3.1.10 Transformer Detail Table; and
    - Exempt Status (for distribution splices) – 3.1.2 Connection Device Feature Class.
- Leveraged Palantir Foundry to incorporate camera installation and weather station installation or optimization into the submission which also marked the first '3.5.5 Other Initiative' reporting.
- Expanded on the information included in our metadata including, but not limited to, definitions and methodology used to identify and report on substation facilities.

Q1 2022 Regulatory Developments

- Energy Safety finalized version 2.2 of the GIS Data Standard on January 14, 2022. Initial draft comments provided by PG&E, Southern California Edison, and Cal Advocates, although acknowledged by Energy Safety, largely were not incorporated in the final version of the GIS Data Standard.
- On February 15, 2022, Energy Safety held their joint, quarterly data check-in meeting with the electrical corporations to communicate submission expectations around 2022 WMP data reporting. Additionally, electrical corporations had the opportunity to provide comments relating to the GIS Data Standard. Key topics included: challenges aligning spatial and non-spatial reports; one-to-many data relationships; request for technical themed workshops on feature dataset sections and confidentiality; and request for a phased approach, prioritization, and partnership to addressing reporting gaps.

Q4 2021 Submission Updates

- Adopted Energy Safety's updated schema (V2.2), incorporating two notable changes – provide scientific name for tree species and match units used for initiative targets with geometry of feature. To adopt these changes PG&E built a lookup table to include the new vegetation genus, species, and common name data.
- Net new data for Conductor Overall Diameter and Ampacity Rating fields added to 3.2.1 Transmission Line and 3.2.2 Primary Distribution Line.
- Included net new data reflecting developments in PG&E's Non-Exempt Surge Arrester Replacement Program (WMP Section 7.3.3.17.3) as part of the 3.5.4.2 Grid Hardening Log and 3.5.4.3 Grid Hardening Point Feature Classes.
- Leveraged Palantir Foundry to include new primary and foreign key identifiers that relate PSPS Event tables to the PSPS Damages tables. For PSPS Event tables we are using multiple data types to create primary key inputs, including Date, Circuit ID, and Isolation Device ID which can be correlated with Primary key inputs for PSPS Damage Event ID tables which include Date and CircuitID.
- Improved the organization and quality of information provided in the metadata for majority of the feature classes and related tables provided in our Q4 2021 submission. Specific improvements included: (i) shifting Summary section inputs to the Description section to align with V2.2's reporting requirements 5; (ii) inclusion of Energy Safety's outlined subsections within each primary section; and (iii) populating the methodology

subsection with file and table names for feature classes and related tables provided in the Q4 submission.

Q4 2021 Regulatory Developments

- On December 17, 2021, Energy Safety released V2.2 of the GIS Data Standard. Version 2.2 was the fourth version of the GIS Data Standard used throughout 2021. PG&E filed comments on this latest version of the Data Standard on December 27, 2021.[10] Through these comments, PG&E highlighted (i) the need for technical workgroups for collaboration and consistent implementation of the GIS Data Standard; (ii) request for additional time to assess changes applied to version changes and for release of all files simultaneously (including the need for alignment across guidance materials); (iii) request for clarification regarding geometry requirements; (iv) technical limitations regarding alignment with tabular reports and confidentiality labels.

Q3 2021 Submission Updates

- Adopted Energy Safety's updated schema (V2.1), accomplished through a series of working sessions with technical and business resources to apply revisions to existing data automation logic used to transform PG&E internal source system data into Energy Safety's updated data schema.
- Developed a Domain Quality Checker Tool via our Foundry Data Management Platform to help ensure that domain values in PG&E's FGDB aligned with Energy Safety's prescribed schema. This tool automates the comparison of PG&Es data outputs (FGDB domain structures) with the domain structures prescribed by Energy Safety.
- Added Expulsion Non-Exempt Fuse Replacements, Transmission Switches, and MSO Switch Replacements in Feature Class 3.5.4.2 & 3.5.4.3 (Grid Hardening Log and Point).

Q3 2021 Regulatory Updates

- On August 20, 2021, Energy Safety released an updated PDF document introducing a new release (V2.1) of the GIS Data Standard. On September 17th, 2021, Energy Safety reissued its GIS Data Standard (V2.1) that incorporated data fields and applied changes to the structure of the data schema with the expectation that electrical corporations adopt this schema for the Q3 2021 submission due November 1st, 2021.
- For its V2.1 assessment, PG&E found discrepancies and misalignments across Energy Safety's requirements documentation, including the PDF document and FGDB, which introduced considerable complexity and resulted in rework to ensure accurate assessment findings.
- PG&E filed Comments on the GIS Data Standard V2.1 on August 27, 2021, highlighting the following: (i) elements of the data schema that are subject to technical limitations; (ii) field requirements that are subject to interpretation and require clarification or are out of alignment with Energy Safety's PG&E 2021 WMP Action

[10] *See* PG&E Comment on Draft GIS Data Reporting Standard Version 2.2 (Dec. 27, 2021).

8 See PG&E Comment on Draft GIS Data Reporting Standard Version 2.2 (Aug. 27, 2021)

Items (iii) proposed methods to improve consistent implementation of the GIS Data Standard across electrical corporations, including the potential benefits of a formalized working group.[8] In addition, PG&E's V2.1 Comment highlighted the technical limitations of labeling confidentiality designations at the record level and outlined our approach to help mitigate the risk of mislabeling confidential records.

Q2 2021 Submission Updates

- Provided data in accordance with the GIS Data Standard (V2).
- Added transmission splice data in Feature Class 3.1.2 – Connection Device and other utility-owned power line data in Feature Class 3.6.1. – Other Power Line Connection Location.
- Progressed data quality through consolidation of Distribution Outage data across multiple source systems and trackers in Palantir Foundry. In addition, leveraged this platform to create connectivity across source systems that contain data for Feature Class 3.4.3 – Ignitions, enabling association between Ignition events and near weather station.

Q2 2021 Regulatory Developments

- On June 23, 2021, Energy Safety held a joint meeting with the electrical corporations to communicate expectations around 2021 WMP data reporting, including desired alignments across spatial and non-spatial reports.
- PG&E performed an initial assessment of overlaps in data reported between the Quarterly Data Report (QDR, non-spatial) and Energy Safety GIS Data Standard (spatial) submissions.

Q1 2021 Submission Updates

- Adopted Energy Safety's updated schema (V2) which introduced significant change. This was accomplished through re-development of existing queries, re-training of Data Stewards (SMEs), and changes in overall data collection, curation, and transformation techniques.

- Incorporated additional fields (e.g., PSPSDays and PSPSDaysDateBasis in the Critical Facilities feature class) and feature classes such as 3.6.5 Major Woody Stem.
- Developed a minimum viable product with our new data management platform to help manage data pipelines across source systems and automate reporting for select feature classes. This platform will continue to develop in future quarters.

Q1 2021 Regulatory Development

- On February 4, 2021, Energy Safety released an updated GIS Data Standard (V2) that incorporated new feature classes and data fields as well as changes to the structure of the data schema.

Q4 2020 Submission Updates

- Expanded mapping of Energy Safety GIS Schema to PG&E's internal SAP schema for feature dataset 3.1 (Asset Point) and 3.2 (Asset Line).
- Enhanced the quality by addressing prioritized findings from Energy Safety Evaluation. For example, PG&E increased the specificity of the Status Report and enhanced its accuracy relative to the FGDB data submitted. Additionally, a baseline Metadata entry was delivered.
- On February 4, Energy Safety released GIS Data Standard Version 2 which incorporated new feature classes and data fields as well as changes to the data schema structure.

Q3 2020 Submission Updates

- Instituted multiple measures to improve the quantity and quality of our submission
- Increased number of Feature Classes and data attributes submitted while providing a more comprehensive Status Report.
- Implemented data collection processes to enable more efficient data collection, curation, and organization, and mapping ES GIS Schema to PG&E's internal GIS schema for 3.1 (Asset Point) and 3.2 (Asset Line).

Q3 2020 Regulatory Developments

- On January 8, 2021, the Wildfire Safety Division (for ease of reference, the Wildfire Safety Division will be referred to by its new name, Energy Safety, throughout this document) provided its Evaluation of Pacific Gas and Electric Company's First Quarterly Report (Energy Safety Evaluation) detailing findings on completeness and quality of GIS data submitted by PG&E on September 9, 2020.

Q2 2020 Submission Updates

- Included 15 of 38 feature classes and 4 of 15 related tables in the FGDB format.
- Data for another 4 feature classes and 2 related tables was submitted in tabular format as an appendix file.

Q2 2020 Regulatory Developments

- Energy Safety released its Draft GIS (Geographic Information System) Data Reporting Requirements and Schema (GIS Data Standard) on August 5, 2020.