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ORA-SDGE-012-TCR
SDG&E 2019 GRC – A.17-10-007
SDG&E RESPONSE
DATE RECEIVED: NOVEMBER 3, 2017
DATE RESPONDED: NOVEMBER 20, 2017

Exhibit Reference: SDG&E-14
SDG&E Witness: Alan F. Colton
Subject: Data and Data Sources for T&D Equipment

Special Instructions: ORA issued DRP data request 5 rev. 1 in R.14-10-013 on March 2, 2017 ("DRP DR5"). SDG&E provided a response with attached spreadsheets on May 10, 2017. The following questions refer to this data request, attached, and SDG&E's responses, attached, as background to SDG&E current GRC T&D request.

Please provide the following:

1. SDG&E's response Q2 and Q4 listed the following as sources for substation and feeder data. For each, provide a brief narrative describing the data source and how it is used at SDG&E, whether it is a "system of record," system vendor and model if purchased (otherwise state "developed in house," operational date, whether upgrades or replacement is being requested in this GRC, and applicable documents (e.g. design and standard practice manuals or standards) that help explain SDG&E's data request responses.

    a. Engineering Data Warehouse (EDW),
    b. Electric Transmission Schematic (ETS),
    c. Electric Design Manual,
    d. Cascade,
    e. Engineering Knowledge,
    f. Engineering Standard Practices,
    g. "GO" (for subpart ab),
    h. Condition Base Maintenance (CBM),
    i. GIS,
    j. Synergi,
    k. SAIDIDAT,
    l. MK6D database,
    m. DIIS (Distbn Interconnection Info Sys),
    n. Customer Application,
    o. Customer Data Warehouse.

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SDG&E Response 1:

For the purposes of this response, SDG&E interprets the term 'system of record' to mean an information storage application that is recognized as the official source of specific data.

a. The EDW is a collection of engineering data that reports measurements of the distribution system and distribution assets. EDW provides various reporting for SDG&E to assist with problem solving and running queries of the distribution system. EDW is not a system of record, was developed in house and was operational in 2002. This GRC does not include any upgrades or replacements.

b. Electric Transmission Schematic (ETS) is a one-line diagram of SDG&E transmission system, containing ratings of the transmission equipment, along with the substations connecting the transmission lines. ETS is used as a reference for internal employees of the transmission system. ETS is not a record, was developed in house and was operational around 1995. This GRC does not include any upgrades or replacements.

c. The Electric Design Manual is a technical reference standard of the distribution system, used by customer project planners and engineers to design the distribution system. The Electric Design Manual is a system of record, developed in house and was operational in 1985. This GRC does not include any upgrades or replacements.

d. Cascade is used to document details for all apparatus connected to our substation grid in addition to apparatus that is in stock awaiting connection. The vendor for Cascade is DNV GL and the version is 3.51. Cascade is a system of record and was operational in 1999. This GRC does not include any upgrades or replacements.

e. Engineering knowledge, is an intellectual acquisition of information developed over time, based on an employee's experience and involvement with designing SDG&E's service territory. It is used by all employees who have completed or have been involved in projects, processes or calculations and contributed to all stages that results in a successful installation or a completion of a project or response to an issue. Engineering knowledge is not considered a record and is developed in house. This GRC does not include any upgrades or replacements.

f. Engineering Standard Practices, refers to documents and guidelines used to develop site-specific designs. These Engineering Standard Practices are developed using best engineering practices and pulled from multiple sources including recognized industry

SDG&E Response 1 Continued:

standards (e.g. ANSI or IEEE standards), applicable codes and regulations, vendor documentation, experience, as well as information obtained from other utilities and conferences. Engineering Standard Practices greatly increase efficiency by limiting the amount of engineering required for each site, reduce operating cost by allowing for interchangeable and vendor neutral equipment, and improve flexibility for future modifications. Engineering Standard Practices may be documented, or may be institutional knowledge. Engineering Standard practices that are documented are a record and this GRC does not include any upgrades or replacements.

g. GO was used as a reference to the ETS. GO stands for Grid Operations, which is the source the department that created, updates and publishes the ETS. Details of ETS are contained within SDG&E's response 1.b.

h. Condition Base Maintenance (CBM), equipment is new to our system and should be classified as a system of record from the vendor Dynamic Ratings. The existing model is DRMCC-E3 and CBM was operational in 2009. This GRC includes further expansion of CBM equipment within SDG&E service territory.

i. Geographic Information System (GIS), is a web interface providing geographical information and data of SDG&E's assets. It is used by SDG&E to identify circuit facility data on a map and is a system of record. The vendor for GIS is ESRI and the model is 9.3.1. GIS was operational in 2012 and upgrades to GIS are requested within this GRC.

j. Synergi, is a vendor provided electric simulation software providing planning tools to analyze the distribution system. SDG&E uses this software to model and conduct power flow simulations of the distribution system. The vendor is DNV GL and the model is 6.0.2. Synergi was operational in 2003 and upgrades or replacements to Synergi are not included within this GRC.

k. SAIDIDAT is used to house summary reliability data for each unplanned outage that affects customers. Data housed in SAIDIDAT includes cause code, restoration steps, SAIDI/SAIFI/MAIFI compiled data, and other information attributed to each outage. SAIDIDAT is considered a system of record and was developed in house. It has been operational since the early 1980's and replacement is requested within this GRC.

l. The MK6D is a SQL (Structured Query Language) Server Database that stores a subset of our production Customer Information System (Billing System). The database allows users to query this data, so it does not affect our production Customer Information System. The database is not a system of record, was developed in house

SDG&E Response 1 Continued:

and operational around the year of 2000. This GRC does not include any upgrades or replacements.

m. DIIS (Distribution Interconnection Information System) is an application that provides updates to GIS as the installed technology is approved. The information submitted includes at the Substation, Circuit and Transformer level location, the type of technology, the size of the system, whether it is inverter-based, synchronous or induction, and whether it is Exporting, Non-Exporting or Inadvertent Exporting. DIIS maps to GIS as a record and was developed in-house. It was operational in 2013, and this GRC does not include any upgrades or replacements.

n. Customer Application is a record tied to the DIIS, the technology listed in SDG&E's response to 1.m.

o. The Customer Data Warehouse is a user-friendly title for the MK6D database, a SQL Server Database that stores a subset of our production Customer Information System (Billing System). The database allows users to query this data, so it does not affect our production Customer Information System. The database is not a system of record, was developed in house and operational around the year of 2000. This GRC does not include any upgrades or replacements.

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2. SDG&E's response to Q2d lists a few terms that are not familiar to ORA. Please define the following in the context used in SDG&E's response and why they impact the data available:

    a. "PLMN",
    b. Mapping,
    c. Meter subs.

SDG&E Response 2:

a. PLNM is the acronym for Point Loma Navy Metering. PLNM is a substation in SDGE service territory. This was provided to identify why PLNM did not have the corresponding data and indicate an example of the types of substations that would not have the data requested.
b. The "mapping" identification pertains to substations not owned by SDG&E, but are in our GIS mapping system as reference only. Information was provided to identify why the data might not be available for some locations.
c. The "meter subs" are substations that SDG&E does not own, but meters (that is, SDG&E measures) the consumption serving the customer. Information was provided to identify why the data might not be available for some locations.

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3. Regarding SDG&E's responses to questions Q1 g through I provide information pertaining to the classification of assets as transmission vs. distribution. Please provide the following:

   a. It appears that substations are classified as transmission if the high-side voltage is 69 kV or higher, independent of the low-side voltage. Is this universally correct? If not, please explain.

   b. If a substation has a high-side voltage of 69 kV or higher, and a low-side voltage of 18 kV or lower, are some assets in the substation classified as distribution assets? Please explain and include SDG&E's general classification guidelines and any types of blanket exceptions.

   c. Is SDG&E's classification of assets as transmission or distribution consistent with FERC definitions? If not, please explain and detail any inconsistencies.

SDG&E Response 3:

a. This is correct within the SDG&E system.

b. Yes, any asset that operates at a nominal voltage of 4kV or 12kV on our primary distribution system is considered a distribution asset. Per FERC Electric Uniform System of Accounts, account 362 Station Equipment under distribution plant states, "this account shall include the cost installed of station equipment, including transformer banks, etc., which are used for the purpose of changing the characteristics of electricity in connection with its distribution." If there are higher voltages in addition to the previously specified present in the substation, then it would be considered a Transmission Substation since it carries a transmission class voltage (69kV and above).

c. Yes, in addition to the FERC account 362 Station Equipment (Distribution), FERC account 353 Station Equipment under Transmission plant states "this account shall include the cost installed of station equipment, including transformer banks, etc., which are used for the purpose of changing the characteristics of electricity in connection with its distribution." Also, per the NERC glossary of terms used in Reliability Standards as approved by FERC, Transmission Line is defined as a system of structures, wires, insulators and associated hardware that carry electric energy from one point to another in an electric power system. Lines are operated at relatively high voltages varying from 69kV up to 765 kV, and are capable of transmitting large quantities of electricity over long distances. Transmission is defined as an

SDG&E Response 3 Continued:

interconnected group of lines and associated equipment for the movement or transfer of electric energy between points of supply and points at which it is transformed for delivery to customers or is delivered to other electric systems.

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4. SDG&E's responses to questions Q1 u and v list "NA" for load data at 60 substations, excluding confidential data. Is it correct that for these 60 substations, SDG&E does not have instrumentation to remotely monitor and record the current and voltage within the substation via SCADA or any other form of communication? If not, please explain.

SDG&E Response 4:
For substations with low side voltage of 12kV or below, SDG&E only provided data where SCADA or DPR (Digital Pulse Recorder) was installed in the requested year of 2015. SDG&E also collects data via Drag hand (manual read on a weekly or by weekly basis).

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5. Regarding SDG&E's responses to questions Q1 w and x, please provide the following:

   a. What term(s) does SDG&E use for the control centers where SDG&E's transmission system is monitored and controlled?

   b. What term(s) does SDG&E use for the control centers where SDG&E's distribution system is monitored and controlled?

   c. Provide a list of SDG&E's control centers, consistent with SDG&E's responses to subparts a and b, including name and location. If each control center monitors and controls only a portion of SDG&E's T&D assets, provide a map showing these relationships.

   d. Provide a brief summary of the methods SDG&E uses to transmit information between its operation control center(s) and substations.

   e. Provide SDG&E's names for each communication system used between operation control centers and substations.

   f. An explain if substations connected with fiber optic systems can also have nonfiber optic systems, and vice versa, or is only one type of communication system used for each substation.

SDG&E Response 5:

a. Mission Control Center (MCC) & Backup Control Center (BCC)
b. Mission Control Center (MCC) & Backup Control Center (BCC)
c. Mission Control Center (MCC) & Backup Control Center (BCC). Each control center monitors and controls the entirety of SDG&E's transmission and distribution assets.
d. SDG&E uses a combination of the following protocols and communication mediums to transmit information between the operations center and the substations.

- Protocols used: Conitel, SCOMM, DNP
- Mediums used: copper lease-lines, fiber, microwave, satellite

e. SCADA
f. Each substation can have more than one medium for communications. Many substations have a combination of one or more of the following: fiber, microwave, copper lease line, satellite.

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6. SDG&E's response to Q1ac uses the term "RFS" for two substations. Please define this term and how it relates to substation communication and SCADA systems.

SDG&E Response 6:
The term RFS stands for Removed From Service meaning the substation is no longer energized and the substation communication as well as SCADA system are not available.

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7. SDG&E's response to Q1ag lists 2 new, non-operational substations. Provide an Excel table including the following for each of these circuits:

   - Address, if available,
   - GPS coordinates, if address not available,
   - High side voltage,
   - Low side voltage,
   - Number of transformers planned (if not know based on design status, indicate "TBD")
   - Number of feeders exiting the substation planned (if not know based on design status, indicate "TBD").

SDG&E Response 7:

Attachment titled "ORA-SDGE-012 Q07 attachment 1" contains SDG&E's response.

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8. SDG&E's response to Q3 a and b shows two types of circuit numbers: 2 to 4-digit numeric (e.g. 1437) and 3 to 4-digit alphanumeric (e.g. LPS1). Please explain the reason for there being two labeling systems, and the significance, if any, of a circuit being labeled by one method versus another.

SDG&E Response 8:

The 2 to 4-digit numeric circuits identify these circuits are on SDG&E 12kV system with a nominal voltage of 12kV. The 3 to 4-digit alphanumerical are circuits on SDG&E's 4kV system, with a nominal voltage of 4kV.

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9. SDG&E's response to Q3 a through d indicates that Circuit 260 originates in the Otay Lakes substation and that both the circuit and substation are in Jamul. However, SDG&E's RAM map shows only two circuits in Jamul, and both originate from the Jamacha substation.

    a. Please explain this apparent discrepancy and how it should be resolved.
    b. When was the RAM map last updated?
    c. Which is considered by SDG&E to be more accurate: the RAM map of data provided in response to ORA DR 5?

SDG&E Response 9:

a. Otay Lakes and Circuit 260 should be in the San Diego city zip code. SDG&E will update its records.
b. March 2017
c. For Jamul circuits, RAM map is more accurate.

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10. It appears that SDG&E's RAM map does not include all substations and circuits listed in SDG&E's response to DRP DR 5, for example Calavo Gardens and Bostonia. Please explain SDG&E's general guidance for the assets shown in the RAM map versus those that are not, and any exceptions to the general rule.

SDG&E Response 10:

The RAM map shows only substations and circuits on the 12kV System. Calavo Gardens and Bostonia substations are on the 4kV System.

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11. Based on ORA's review of SDG&E's response to Q3k, it appears that the most common limit for feeders leaving the substation is approximately 600 amps (4MVA/ 4,000 V/(Sqrt 3). Is this correct? If not, please explain. In either case, please define the overhead conductor and underground cable types with this limit.

SDG&E Response 11:

The common limit for most feeders is 600 amps, as this is the continuous amperage rating for majority of the distribution equipment on the feeder. Typical underground cable size for the main distribution feeder is 1000 kcmil AL, with a capacity of 580 amps; and a typical main distribution feeder for overhead conductor size is 636 ACSR, with a capacity of 780 amps.

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12. SDG&E's response to Q3q provided no data and the response to Q4 stated "need clarification." Is the lack of data provided in response to this question because 1-phase circuits are not modeled in Synergi? If not, please contact the originator for clarification.

SDG&E Response 12:

The response 'need clarification' was an internal note indicating followup was required on SDG&E's part to more precisely define the information to be sought. This was not done in a timely fashion and SDG&E regrets the delay. SDG&E has recently reached out to the originator for clarification and the Synergi models used by SDG&E does include 3-phase as well as 1-phase on the primary system.

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13. SDG&E's response to Q3w indicates that 36 circuits have devices other than capacitors or voltage regulators that can impact voltage on the circuit. Please list and describe these devices.

SDG&E Response 13:

The devices on those circuits are devices called Auto-Booster, they operate similarly to voltage regulator.

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14. SDG&E's response to Q3 ai and aj shows that 370 circuits have both SAIDI and SAIFI scores of zero in 2015. Is it correct that customers on these circuits experienced no outages, including planned outages? If not, please explain.

SDG&E Response 14:

To clarify, SDG&E provided SAIDI and SAIFI data for distribution unplanned outages originating on the circuits listed. The data did not include planned outages and widespread outages caused by substation and/or transmission events. Based upon this criteria, it is correct that there were no distribution caused outages that affected these 370 circuits for the calendar year 2015.

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15. SDG&E's public response to Q3 ak addresses circuits with load data. Data on feeders outside of a substation require a communication system to monitor and record load data, correct? If not, please explain. If so:

    a. Provide a brief summary of the methods SDG&E uses to transmit information between its operation control center(s) and remote feeder locations.

    b. Provide SDG&E's names for each communication system used between operation control centers and remote feeder locations.

SDG&E Response 15:

Yes, this is correct. In order to obtain real time data and control on feeders outside of substations, a SCADA site with appropriate communication is required.

a. SDG&E uses a combination of the following protocols and communication mediums to transmit information between the operations center and SCADA sites.

- Protocols used: Conitel, SCOMM, DNP, IEC61850
- Mediums used: radio, fiber, copper

b. SDG&E uses the term 'SCADA' for these communication systems.

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16. SDG&E's public response to Q3 ak indicates "NA" for 298 circuits indicating no load data available. SDG&E's response to Q4ak states "load data is not collected from all circuits - some circuits were not operational in 2015 or there are not SCADA circuits." Please provide the following:

    a. For the circuits for which SDG&E has load data, describe where the load is measured generally and any exceptions. For example, hypothetically: load is generally determined based on measurements from PTs and CTs located on the busbar side of the feeder circuit breaker in the substation, but some are measured at the first automated switch.

    b. Is the SCADA system used to control and monitor equipment on circuits as well as substations? If not, please explain.

    c. Do all circuits without load data originate from the substation without SCADA or other remote monitoring capabilities? If not, please explain.

SDG&E Response 16:

a. Load is measured at the circuit breaker or a SCADA switch immediately outside the substation

b. Yes

c. Circuits without load data either originate from a substation or a stepdown transformer. Stepdown transformers do not have remote monitoring.

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17. SDG&E's public response to Q3 ak indicates that load data for circuits 541 and 466 is not confidential, but these circuits have only one customer. Please explain why this load data is not considered confidential and provide data supporting this assertion.

SDG&E Response 17:
The load data for those circuits was erroneously not labeled as confidential. This load data should be considered confidential as one customer exists on circuit 541 and 466.

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18. SDG&E's confidential response to Q3 ak indicates that load data for circuits 159 and 303 is confidential, but these circuits have thousands of customers. Please explain why this load and customer count data is considered confidential and provide data supporting this assertion including the name and 2015 load of large customers if that is the asserted reason.

SDG&E Response 18:

The information was considered confidential because 15% of the load was consumed by one customer. Detailed table below provides further information.

Circuit	Circuit Load* (amps)	Customer Name	Load
159	XXXX	Customer 1	60.36
303	XXXX	Customer 2	257.13
303	XXXX	Customer 3	261.73

* - Please refer to the confidential excel response to the DRP DR 5 for question 3.

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19. SDG&E's response to Q3 ay indicates three 10 MW storage facilities connected to the Escondido substation on circuits 1011, 1012, and 1013. Please provide a map and one line drawing showing the location and interconnection of these facilities.

SDG&E Response 19:

Attachment titled "ORA-SDGE-012 Q19 attachment 1" and ORA-SDGE-"ORA-SDGE-012 Q19 attachment 2" contains SDG&E's response.

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20. SDG&E's response to Q3 lists 21 new, non-operational circuits. Provide an Excel table including the following for each of these circuits:

- Circuit number,
- Substation from which circuit originates,
- Operating voltage(s),
- Closest city,
- GRC that authorized construction,
- Date project authorized by SDG&E and budget assigned,
- Identification number used to track project in the project management system,
- Identification number used to track costs in the accounting system,
- SDG&E authorized budget,
- Spend to date,
- Detailed engineering start date,
- Construction start date,
- Estimated operational date.

SDG&E Response 20:
Attachment titled "ORA-SDGE-012 Q20 attachment 1" contains SDG&E response to Q.20.

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21. SDG&E's response to question Q5 shows the Northeast region covering all territory east of the North Coast region. SDG&E's responses to questions Q1 d and e indicate the Northeast region contains 28 substations. In contrast, page 16 of SDG&E's final report for DRP Demonstration Project A, submitted December 22, 2016, shows an additional region referred to as "Ramona" as a subset of the Northeast region with 11 substations in addition to 29 for Northeast region. Please provide the following:

    a. Maps that shows all SDG&E geographically defined regions, regardless of their use, including but not limited to DPAs, service areas, customer support areas, planning areas, emergency response areas, etc.

    b. Explain the difference in the maps referenced in the main question above.

    c. Explain why the subject data request response shows 28 substations and the Demo A report shows 40 substations in the same geographic area.

SDG&E Response 21:

a. Attachment titled "ORA-SDGE-12 Q21 attachment 1" contains the District map of SDGE service territory. Each district is responsible for that service area providing customer support, planning, emergency response and other services.
b. Ramona is a satellite office within Northeast district.
c. The data request included 230kV, 138/12kV, 69/12kV 12/4kV substations. The DRP Demonstration Project A map[1] included 138/12kV, 69/12kV, 12/4kV substations and step-down transformers 12/4kV.

[1] Page 16 of SDG&E's final report for DRP Demonstration Project A, submitted December 22, 2016