

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans Discovery 2023-2025
Data Response

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| PG&E Data Request No.: | SPD_016-Q008 | | |
| PG&E File Name: | WMP-Discovery2023-2025_DR_SPD_016-Q008 | | |
| Request Date: | May 30, 2024 | Requester DR No.: | SPD_WSPS_PG&E_2024_006 |
| Date Sent: | June 12, 2024 | Requesting Party: | Safety Policy Division |
| PG&E Witness: | | Requester: | Henry Sweat |

SUBJECT: REQUEST FOR CONFIDENTIAL FILES

QUESTION 008

Provide additional information on the criteria for “Red Flag” Conditions – it appears that PG&E also refers to them as “dry wind” conditions [see page 10 of *2025 WMP Update and PG&E’s response to MGRA_Data Request No. 9_Q2*].

- a. Reconcile the terminology –are these synonyms? Explain why if not.
- b. Explain how this partition has impacted modeling in WDRM v4.
- c. Provide the percentage of WDRM v4 risk associated with these days.
- d. Provide the percentage of WDRM v3 risk associated with these days.
- e. Discuss how the risk Bow Tie differs in its use of these days compared to WDRM v4 and v3.
- f. Explain how this criteria compares to classification of weather in both FPI v4.0 and v5.0. Is it similar to R4 or R5 (or another level)? Why/why not?
- g. Explain how this criteria connects to weather that would result in PG&E’s use of a PSPS event.
- h. Explain how this criteria relates to PG&E’s enablement criteria for EPSS.
- i. Provide a list of all CPUC-reportable ignitions for each year from 2014 through April 30, 2024 that occurred during “Red Flag” conditions, Provide the data in the same format as the CPUC-Reportable Ignitions Template submitted yearly to the CPUC, with an additional column indicating if the ignition was in the (1) Tier 2, (2) Tier 3, (3) HFRA (exclusive of HFTD) and (4) non-HFTD/HFRA.
- j. Provide the number of circuit mile days on an annual basis that met the “Red Flag” conditions criteria starting in 1980 (or the first year PG&E’s 30-year meteorology data set) through April 30, 2024.
- k. Provide the predicted number of circuit mile days per year expected to meet the “Red Flag” conditions criteria based on PG&E’s modeling.
- l. In PG&E’s response to MGRA_Data Request No. 9_Q2, PG&E states that the additional explanatory power of dry wind is modest over the predictive destructive condition. Explain.
 - i. Discuss if this is related to the predictive destructive condition already being predicated on an FPI threshold.

ANSWER 008

- a. “Red Flag” conditions are not the same as “dry wind” conditions. Dry Wind Conditions (DWC) status was developed for the consequence modeling in response to both internal and external reviews of Wildfire Consequence (WFC) model v3.4 recommending the inclusion of Red Flag Warnings (RFW) issued by the National Weather Service (NWS). RFW warnings are issued by the NWS when there are weather conditions that would intensify fires. These RFW warnings are issued across a mixture of watershed areas, ridgelines, and jurisdictional boundaries such as county lines. The criteria for issuing a RFW warning is also not consistent across all these areas.

The inconsistencies in RFW criteria causes problems when trying to fit it as a model covariate as the result may be a prediction based on RFW definition rather than the actual local conditions. To avoid the RFW inconsistency issue, the DWC was developed as an internal status covariate for use in the WFC model that could be used across the entire PG&E service territory. The DWC conditions criteria is listed in this table.

| Measurement (daily average) | Limit |
|--------------------------------|---------------|
| Wind Speed | ≥ 19 mph |
| 10-hr Dry Fuel Moisture | $\leq 6\%$ |
| Relative Humidity | $\leq 30\%$ |

- b. Wildfires seem to occur in ‘regimes’ defined by the location, topography, near environment (natural and human), weather (short-term and cumulative), climate, et al.
- The objective is to identify regimes, that are both discriminative of wildfire characteristics, and well enough populated to provide robust statistics.
 - With the addition of PGE-DryWind in v4, we have three factors whose combinations (of Boolean values) define 8 regimes: HFRA, Predicted-Destructive, and PGE-DryWind.

The PGE-DryWind definition relies on wind-speed and relative humidity crossing thresholds which approximate Federal Red-flag conditions in PG&E service territory. While a very large component of this is already captured by the criteria defining ‘Predicted Destructive’ conditions via the FPI models, those models rely heavily on burnable fuel presence and characteristics in addition to weather. We find that there is merit in considering extreme conditions of wind and relative humidity in isolation, to identify areas and conditions conducive to wildfires even in sparse fuel conditions.

- c. In the WDRM v4 consequence, roughly 6.5% of the total wildfire consequence is associated with historical Dry Wind conditions. This approximation to consequence is obtained with the weighted sum over the 8 strata defined by the labels given in the table below. The weights are the fraction of days each pixel is in each of the 8 strata, and the summand is the mean MAVF of historical fires in each strata.

The product of the MAVF and the Percent of Grid Pixel-Days approximates the relative importance of contributions of each stratum to the total consequence and hence risk.

The percentage of strata with Dry Wind True is roughly 6.5%.

Specifically, from the table below, $(502 \times 0.07 + 1.78 \times 0.16 + 1.8 \times 0.04 + 0.46 \times 1.16) / (502 \times 0.07 + 1.78 \times 0.16 + 1.8 \times 0.04 + 0.46 \times 1.16 + 180 \times 2.36 + 1.96 \times 31.56 + 8.64 \times 0.17 + 0.37 \times 64.49) = 6.5\%$.

| HFRA | Dry Wind Conditions | Predicted Destructive | MAVf | Percent of Grid Pixel-Days |
|-------|---------------------|-----------------------|------|----------------------------|
| True | True | True | 502 | 0.07 |
| True | True | False | 1.78 | 0.16 |
| True | False | True | 180 | 2.36 |
| True | False | False | 1.96 | 31.56 |
| False | True | True | 1.80 | 0.04 |
| False | True | False | 0.46 | 1.16 |
| False | False | True | 8.64 | 0.17 |
| False | False | False | 0.37 | 64.49 |

- d. For WDRM v3, we did not have the PGE Dry-Wind strata for historical fires. Therefore, the MAVF value takes only 4 values corresponding to the combination of HFRA X Predicted Destructive labels.
- e. The risk bow-tie uses red-flag warning days as they were historically called by weather forecasters using region specific criteria. As described in the response to subpart (a) above, the dry-wind condition is different but designed to retain the predictive power of RFW.
- f. The R1 to R5 conditions are an output of the FPI model which uses factors such as wind speed and fuel moisture as inputs. The “dry wind” conditions are a classification of wind speeds, fuel moisture, and humidity. While there is likely to be a significant overlap in areas with high R scores from the FPI model and areas that meet the “dry wind” conditions criteria, they are not directly correlated.
- g. PSPS decisions are driven by the R1-R5 conditions which are an output of the FPI model which uses factors such as wind speed and fuel moisture as inputs. The “dry wind” conditions are a classification of wind speeds, fuel moisture, and humidity. While there is likely to be a significant overlap in areas with high R scores from the FPI model and areas that meet the “dry wind” conditions criteria, “dry wind” conditions are not directly used as an input to PSPS decision making.
- h. Similar to PSPS, EPSS enablement criteria uses R scores from the FPI model which is similar to the DWC “dry winds” criteria as explained in subparts (f) and (g).
- i. Please see attachment “WMP-Discovery2023-2025_DR_SPD_016-Q008Atch01.csv” for the training fires used in fitting the Wildfire consequence model. They are VIIRS detected fires within the training season (June-November inclusive) with lightning fires removed from low-fire danger days (as non-representative). The predicted_destructive_flag, the pdw_flag (PG&E Dry wind) flags, and the rfw_flag (red flag warning) flags are present.

- j. Since the WFC model does not use RFW days as a direct input as described in response to subpart (a) for this question, an export showing “Red Flag” conditions over the requested period is not available.
- k. The WFC model is designed to quantify Wildfire Consequence. It is not designed to make predictions of future weather conditions which determine “Red Flag” conditions.
- l. Yes. The explanatory power of dry wind is modest. PGE-Dry Wind definition relies on wind-speed and relative humidity crossing thresholds which approximate Federal Red-flag conditions in PG&E service territory. While a very large component of this is already captured by the criteria defining 'Predicted Destructive' conditions via the FPI models, these models rely heavily on burnable fuel presence and characteristics in addition to weather. There is merit in considering extreme conditions of wind and relative humidity in isolation, to identify areas and conditions conducive to wildfires even in sparse fuel conditions even if the additional impact is small.