**From:** [redacted]

**To:**
**Sent:** 5/27/2021 5:06:23 PM
**Subject:** FW: REFCL - Quick Question
**Attachments:** Site Study List.xlsx

Classification: Confidential

**From** [redacted]
**Sent:** Tuesday, April 20, 2021 1:10 PM
**To:** [redacted]
**Cc:** [redacted]
**Subject:** RE: REFCL - Quick Question

Classification: Confidential
The spreadsheet is attached.
This was a preliminary list to facilitate a detailed review of 8 substations (ORO FINO CHALLENGE PINE GROVE FORESTHILL BONNIE NOOK WILLITS A MIDDLETOWN KANAKA), and narrow down to the first two REFCL deployments after Calistoga. We focused on locations within the top 10% for risk while also considering level of effort for deployment. The assumption I made is that targeted system hardening would address the maximum fire risk score, while REFCL protects every connected circuit on the substation bank, so averaging the fire risk score of each circuit to roll up to the substation level seemed appropriate.

[redacted] if your team has a different approach to the risk scoring for REFCL, I'm open to suggestions. If you can more cleanly combine individual circuits to the substation bank level that would be helpful. We combined a few data sources to come up with this spreadsheet, focusing on substations with 3-wire distribution circuits. This is what we have right now after quickly pulling data together to get an idea of future REFCL deployments. Again, this list is subject to change, pending additional detailed reviews and experience gained with REFCL deployment.

Thanks,

[redacted]

**From** [redacted]
**Sent:** Tuesday, April 20, 2021 12:30
**To:** [redacted]
**Cc:** [redacted]
**Subject:** RE: REFCL - Quick Question

[redacted] do you have underlying spreadsheet behind the table below? I am assuming that these risk scores are coming from the 2021 Dx risk model (conductor model). If so, once we get the list of the CPZs associated with these substations from that spreadsheet, we can assign those CPZs to 'to-be-determined' tranches for RSE calculation using the GRC model. Benson, let me know if I am off base here.

[redacted]

**From** [redacted]
**Sent:** Tuesday, April 20, 2021 11:29 AM
**To:** [redacted]
**Cc:** [redacted]
**Subject:** RE: REFCL - Quick Question

[redacted]

Thanks for the education. Do you mind adding that as an extra column on the below table to flag single vs 2 bank for additional clarity.

Thanks,

[redacted]

**From:** [redacted]
**Sent:** Tuesday, April 20, 2021 11:25 AM
**To:** [redacted]
**Cc:** [redacted]
**Subject:** RE: REFCL - Quick Question

Classification: Internal
Brunswick is a 2 bank substation. 2 banks means two GFNs and multiple GFNs at one substation introduces additional challenges and considerations. REFCL is not plug and play, so the preferred approach is to target successful deployment at single transformer bank substations before taking on a 2 bank substation.

Thanks,

[redacted]

**From:** [redacted]
**Sent:** Tuesday, April 20, 2021 11:21
**To:** [redacted]
**Cc:** [redacted]
**Subject:** RE: REFCL - Quick Question

[redacted]

Any insights why Brunswick is not earlier on our prioritization? My understanding is we're prioritizing Foresthill and Challenge next. I just got off a review of PSPS impacted circuits and the Brunswick sub ranks extremely high (if not the highest). Considering it also has WF benefits, wondering what your thoughts are.

Thanks,

[redacted]

**From:** [redacted]
**Sent:** Tuesday, April 20, 2021 10:40 AM
[redacted]
**Subject:** RE: REFCL - Quick Question

Classification: Internal
The sites are subject to change, but if we deploy at the top 20 wildfire risk substations with 3-wire circuits, the total HFTD circuit mileage is 3725 for 20 substations.

| Sub | Max of Fire Risk | Average of Fire Risk | Sum of Tier 2/3 OH Miles | Exposure (Avg Risk * Miles) |
|---|---|---|---|---|
| BRUNSWICK | 60.9 | 12.6 | 488.4 | 61 |
| EL DORADO PH | 70.6 | 26.4 | 190.5 | 50 |
| WEST POINT | 40.2 | 16.6 | 293.9 | 48 |
| MIWUK | 81.7 | 23.2 | 152.9 | 35 |
| APPLE HILL | 29.1 | 7.2 | 487.3 | 35 |
| ORO FINO | 49.4 | 21.6 | 156.0 | 33 |
| CHALLENGE | 41.1 | 28.9 | 112.3 | 32 |
| PINE GROVE | 45.7 | 12.2 | 250.7 | 30 |
| FORESTHILL | 44.1 | 25.3 | 95.0 | 24 |
| STANISLAUS | 45.4 | 18.0 | 130.9 | 23 |
| COLUMBIA HILL | 36.3 | 20.8 | 90.9 | 18 |
| BONNIE NOOK | 45.9 | 30.9 | 58.8 | 18 |
| VOLTA | 25.6 | 6.4 | 281.2 | 17 |
| WILLITS | 32.2 | 7.1 | 231.8 | 16 |
| MONTE RIO | 31.0 | 10.9 | 140.6 | 15 |
| ALLEGHANY | 31.5 | 17.4 | 79.5 | 13 |
| MOLINA | 33.8 | 9.3 | 147.4 | 13 |
| LOS GATOS | 43.4 | 7.2 | 180.4 | 12 |
| MIDDLETOWN | 42.9 | 7.4 | 156.6 | 11 |

[redacted]

**From:** [redacted]
**Sent:** Tuesday, April 20, 2021 09:13
**To:** [redacted]
**Cc:** [redacted]
**Subject:** RE: REFCL - Quick Question

Wouldn't the next 2020-2026 installations be assumed to be in those 20 sites? If so, could we have those sites with associated circuits?

**From:** [redacted]
**Sent:** Tuesday, April 20, 2021 9:07 AM
**To:** [redacted]
**Cc:** [redacted]
**Subject:** RE: REFCL - Quick Question

Classification: Internal
REFCL will only work on 3-wire 12 kV, 17 kV and 21 kV circuits which is roughly 75% of the total circuits within the HFTD. There are some other technical requirements that are used in the screening for REFCL but the 3-wire criteria is the main item. We can provide the screening for the next 20 sites but if you need a list of all the potential circuits that will take time to compile.

[redacted]

**From:** [redacted]
**Sent:** Tuesday, April 20, 2021 8:53 AM
**To:** [redacted]
**Cc:** [redacted]
**Subject:** RE: REFCL - Quick Question

[redacted]

[redacted] previously provided the miles for Calistoga circuit. Please see the table in the bottom in the file attached. (ignore the risk scores there).

My question to [redacted] is whether we can narrow down the name of circuits that the REFCL is applicable or being considered for 2022-2026, rather than saying that all HFTD distribution circuits are applicable.

[redacted]

**From:** [redacted]
**Sent:** Tuesday, April 20, 2021 8:43 AM
**To:** [redacted]
**Cc:** [redacted]
**Subject:** RE: REFCL - Quick Question

[redacted]

Thank you for the quick response!

Last question - how many HFTD Distribution line miles will Calistoga Substation's REFCL Installation cover in 2021?

To summarize our discussion from yesterday:

**REFCL Effectiveness:** 58% based on attached analysis.

**REFCL Drivers/Subdrivers**: REFCL can potentially detect faults triggered by all Equipment Failure Subdrivers with the exception of Fuse and all Vegetation Subdrivers.

**REFCL Program Exposure:** Given 2 REFCL installations are planned to be installed each year from 2022-2026, and each installation is expected to cover ~100 miles of HFTD Distribution, program exposure will be 200 HFTD Distribution miles per year 2022-2026. In 2021, 1 REFCL Installation will cover the Calistoga circuit covering X HFTD Distribution miles.

**REFCL Benefit Length**: 15 years based on conservative estimate of REFCL Asset Life.

Please let me know if anything above should be adjusted!

Best,

[redacted]

MSD ENGR

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**From:** [redacted]
**Sent:** Tuesday, April 20, 2021 8:18 AM
**To:**
**Cc:** [redacted]
**Subject:** RE: REFCL - Quick Question

Classification: Internal
Calistoga Substation will be online in 2021 and is the first installation.

[redacted]

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**From** [redacted]
**Sent:** Monday, April 19, 2021 8:03 PM
**To:**
**Cc** [redacted]
**Subject:** REFCL - Quick Question

Hi [redacted]

Very quick question that came up today – we're using 200 HFTD Distribution miles for Program Exposure for the GRC Period given we plan to install 2 REFCL locations per year, each covering 100 miles roughly.

However – for 2020-2022 are you able to provide the exact circuits you're planning to install REFCL on (or we have already installed)? Please forgive me if you provided this previously and I'm forgetting – I recall Calistoga being included as mentioned today.

Thank you,

[redacted]

MSD ENGR