Memorandum

To:	Andrew Parker, AIC and Jennifer Morris, ICC Staff
From:	Opinion Dynamics Evaluation Team
Date:	April 17, 2020
Re:	Ameren Illinois Company Voltage Optimization Verification and Exclusion Approach

This document summarizes recent discussions between Opinion Dynamics, AIC, and ICC Staff, outlining the data requirements for the agreed-upon verification of continued operation of voltage optimization (VO) during the evaluation period. This document also includes a discussion of allowable exclusions for VO.

Verification

Purpose

As discussed between Opinion Dynamics, AIC, and ICC Staff, we will conduct subsequent year verification of VO operation. Verification will be conducted for process purposes only; VO savings are deemed for 15 years once initial evaluation of a circuit is completed and no retroactive changes will be made to savings.

To summarize the agreed upon approach, in the first year of operation of VO for each circuit, Opinion Dynamics will determine the first-year savings associated with that circuit. For the remaining years of operation for each circuit, Opinion Dynamics will conduct verification activities to assess the degree to which VO continued to operate throughout each year.

The purpose of verification is to provide information to stakeholders and other parties as to the level of continued operation of VO throughout the 15-year deemed period of savings, and, if needed, to provide context as to why VO may not have operated continuously throughout the period. This information will be presented in the annual impact evaluation report for VO.

Approach

To confirm that VO is operational, we will require data from a given cohort after estimating first year savings from AIC. We understand that as VO implementation expands to include over a thousand circuits over the lifetime of the study, providing a full year of operations data to support verification for each circuit is infeasible. As a result, we will request data for only a sample of circuits in each cohort each year. Our sampling strategy is detailed later in this memo.

To assess whether a circuit is operational, we will require, at minimum, operation log summaries and voltage data for a sample of VO circuits. We understand that the process of producing complete operations logs is fairly time-consuming and complex, given the manual nature of its development. As a result, AIC suggested that we share the sampled set of circuits with them in advance of a given year to make the process of producing logs easier. ICC Staff expressed some concern about this approach, which is non-traditional in that typically samples are drawn retrospectively so that program administrators have no knowledge of what will be sampled, which ensures that the sample maintains a high degree of integrity for evaluation purposes.

We propose a strategy for acquiring the necessary information for sampled circuits that seeks to balance the concerns of all parties.

Verification Methodology

We will draw the sample retrospectively (e.g., provide AIC no knowledge of which circuits will be sampled until after the period being evaluated). We concur with the general thoughts of ICC Staff on this point – to maintain the integrity of a sample, it is preferable to draw a sample in this manner.

To help assuage AIC's concerns about preparing the required data, we request a more limited version of operations logs for this retrospectively drawn sample.

Our understanding is that automated operations logs are produced that summarize VO status (e.g., "on/off") for specific hours throughout the year at a circuit level. Given that we generally expect VO will run for nearly all hours in a year, we will rely on VO status summaries, in conjunction with voltage data, as a first step. Our approach will be as follows:

- Should VO operate over a 90% threshold, we will report that VO operated for over 90% of the year. This analysis will be conducted at a per-circuit level.

  - To validate findings from the operations logs, we will use voltage data to conduct visual inspections against the operations logs and ensure that patterns in the operations logs match the patterns shown in the data. For example, when the logs indicate that VO is turned off, the voltage data confirms that it is turned off. We suggest this approach because our analyses to date have uncovered some inconsistencies between operational logs and voltage data. We will conduct this analysis for the first year of verification. If operations logs and voltage data align at that time, we will use only operations logs moving forward. If operations logs and voltage data continue to disagree, we reserve the right to continue to request voltage data from AIC to ensure our verification analysis accurately reflects continued operation.

- Should VO operate for less than the defined threshold of 90%, we will *then* request more detailed information (e.g., the operational change notes) from AIC as to why VO did not operate for periods during the year, for only those sampled circuits where this occurred. We would request that those notes also indicate whether events that caused VO to not operate are "excludable" events.

We anticipate that this approach would minimize upfront time spent by AIC to prepare operations logs, while still allowing for more detailed reporting of variances in VO operation if needed.

Sample Details

We will use a cross-sectional sample, which will allow us to optimize the sample for each cohort while minimizing the overall sample size across all cohorts. Notably, a cross-sectional sample requires a unique sample to be drawn each year. Table 1 details the sample strategy and required number of circuits in the sample through 2025. Note that the maximum number of circuits to be included in the operation verification sample is 250 in year 2025. Please note that this sampling strategy is the same as previously developed in summer 2019 when a more focused verification strategy was being considered.

Table 1. Proposed Sample for VO Verification Efforts

Program Year	Circuit Deployment Cohort	Incremental Number of Circuits Deployed	Cumulative Number of Circuits Deployed (N)	Proposed Sample Size for Operation Verification (n)						
				2019	2020	2021	2022	2023	2024	2025
2019	Cohort 1	19	19	19*	10	10	10	10	10	9
2020	Cohort 2	130	149		130*	40	21	14	11	9
2021	Cohort 3	170	319			170*	27	19	14	12
2022	Cohort 4	182	501				182*	20	15	13
2023	Cohort 5	182	683					182*	15	13
2024	Cohort 6	182	865						182*	13
2025	Cohort 7	182	1,047							182*
Total Sample for Operation Verification				19	140	220	240	245	248	250

*This data will be used for the energy savings analysis in that year.

To complete the approach outlined above, we will require the following items from AIC:

- Automated operations logs, covering the full year, for retrospectively sampled circuits
- AMI voltage data for sampled circuits, if possible.

Exclusions

During conversations with the evaluation team, ICC Staff, and stakeholders, AIC raised the concept of "excludable events." AIC has indicated that certain circumstances occur during which it is required or best practice that VO be disabled. Some of these events are typical and therefore should be considered part of standard operation and included in the VO evaluation. However, other events are not expected and/or outside of AIC control. AIC must balance achieving VO savings with operating their system effectively, reliably, and safely, and penalizing AIC for events that could interfere with this would create concern. Accordingly, AIC prepared Table 2, which lists example events that have occurred during the initial period of VO operation, and categorizes the events as "excludable" or "not excludable." The evaluation team agrees with these categorizations and memorializes them in this memo for future reference. It is the current understanding of the evaluation team that ICC Staff and stakeholders also support these categorizations.

Table 2. Table for Excludable and Non-Excludable VO Events

Event	Description	Reason/Explanation	Category
Circuit Outage	Anytime the majority of a circuit is out due to any reason.	Circuit outages are typically not predictable/planned and are outside of AIC control. They are an anomaly and are not certain to occur on the same circuit in subsequent years.	Excludable
Repair / Maintenance	Repair/maintenance work is performed on a VO circuit causing VO to disable.	Repair/maintenance of the AIC system is an operational necessity to provide customers with safe and reliable electric. These events are not certain to occur on the same circuit in subsequent years.	Excludable
Switching	Dispatch disables VO on the circuit for any necessary switching event.	AIC will perform switching for storms/outages, repair/maintenance, safety, and work to support new customer growth. These events are not certain to occur on the same circuit in subsequent years.	Excludable
Technology	A failure of the information and/or communication technology which results in "all" VO circuits being disabled simultaneously due to events outside of AIC's control.	VO is dependent upon third party infrastructure that AIC has no control over. Examples include the loss of the cellular communications network (AT&T and Verizon), the failure of the VO software provided by the outside vendor, or a cyber event. Events of this nature are an anomaly and are not certain to occur year after year. This event is not predictable/planned and is outside of AIC control.	Excludable
Worldwide Pandemic / Orders by Civil Authorities	Repairs and maintenance may take longer due to limited crew availability or other restrictions/priorities. Example: COVID-19	AIC has no control over these events. Due to restrictions, repairs and maintenance may take longer. This reasonable delay is outside the control of AIC.	Excludable
Disaster Recovery (DR) Testing	Ameren periodically performs disaster recovery testing on systems (AMI, ADMS, VO, etc.) which could result in VO disabling.	Disaster recovery is necessary and critical to ensure that AIC can operate safe and effectively during an unforeseen event.	Not Excludable

Event	Description	Reason/Explanation	Category
	Typically, all VO circuits would be affected during DR testing.		
Server Patching / Issues	Anytime servers would go down or if patching took place and VO system did not come back online due to servers not rebooting correctly.	Events of this nature are unavoidable but should be addressed by AIC timely. This should result in negligible impacts to energy savings.	Not Excludable
Configuration Changes	Anytime VO disabled for making updates to the Orion, go-live testing, or if AIC has to make changes on the system resulting in shutting down services.	Events of this nature are unavoidable but should be addressed by AIC timely. This should result in negligible impacts to energy savings.	Not Excludable
VO Field Hardware Failures	The loss or failure of a voltage regulator control, LTC control, or switched capacitor control on a circuit.	Events of this nature are unavoidable but should be addressed by AIC timely. This should result in negligible impacts to energy savings.	Not Excludable
Loss of Communications	Anytime a device was in communications failure that would result in VO disabling. This event does not include 3rd party cellular communications network (e.g. AT&T and Verizon) failures.	Events of this nature are unavoidable but should be addressed by AIC timely. This should result in negligible impacts to energy savings.	Not Excludable

Note: Table was prepared by AIC. The evaluation team is in agreement that the excludable and non-excludable events listed in the table are reasonable.