Risk-based Registration Phase II: Data Analysis

September 2015
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Executive Summary

Phase II of the Risk-Based Registration Initiative (RBR) focused on determining whether there are groups of lower risk Generator Owners (GOs), Generator Operators (GOPs), Transmission Owners (TOs), or Transmission Operators (TOPs) that do not need to be subject to certain NERC Reliability Standards and would qualify for a reduced set of compliance obligations.

As part of the Phase II effort, NERC staff held workshops and meetings, with participation by reliability stakeholders including industry subject matter experts, trade associations, committees, Regional Entities and governmental authorities, to identify potential candidates and various options. Members of the RBR Advisory Group (RBRAG) and the RBR Task Force (TF) provided valuable input and advice for the RBR design and implementation plan. However, despite the substantive efforts of NERC staff and these two reliability stakeholder groups, a group of lower risk GOs, GOPs, TOs or TOPs with consistent characteristics that would qualify for a reduced set of compliance obligations were not identified.

As a final effort to identify groups of lower-risk organizations, NERC staff reviewed event and enforcement information, including findings of non-compliance resulting in assessed violations and potential violations (hereinafter, PVs). Specifically, NERC staff identified entities within the referenced four functions that: (a) have not contributed to a Bulk Electric System (BES) event, and (b) have never had a potential violation of NERC Reliability Standards (PV), whether related or not as a result of a BES event. This report summarizes NERC staff’s analysis of the event and enforcement data.

Taking into account all of the analysis and input, NERC staff has determined that, at this time, there is not a consistent set of criteria or system characteristics that defines a group or groups of lower risk registered entities within the four referenced functions. NERC staff has concluded the proper approach is to refer individual potential candidates to the NERC-led review panel, on a case-by-case basis that can account for their individual facts and circumstances, until such time as a consistent pattern emerges that warrants a common sub-set list. Registered entities that have had a PV are not precluded from requesting consideration from the NERC led panel. Moreover, the presence or absence of a possible violation or involvement in a BES event is not a sole determining factor as to whether an entity is eligible for a sub-set list of Reliability Standards.

Through this analysis, NERC staff has preliminarily identified two sets of smaller groups of entities that may be initial candidates for consideration by the NERC-led review panel for eligibility of a sub-set list of Reliability Standards. The first group identified by NERC staff includes approximately 28 registered entities designated by the NERC Generating Availability Data System (GADS) definition, as owning and/or operating only gas turbine (GT) units. NERC staff determined these entities had not contributed to an event and had not received a PV from 2007 to the present date. NERC staff determined that a Phase II GO/GOP sub-set list is not warranted at this time, because a given entity’s lack of involvement in events and non-compliance history may be due to the limited run times of these units, and not necessarily because the entity does not inherently pose a lower risk to the BES. Indeed, the entity’s units may be critical for the reliability of the Bulk Power System (BPS) during peak times and

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1This approach was adopted for this analysis only. It is recognized that registered entities that are finding and reporting instances of non-compliance may pose less risk to the BES than entities that are not identifying possible non-compliance with NERC Reliability Standards.
2 This included entities that had caused, contributed to, exacerbated or prolonged an event.
3 While participation in NERC’s event analysis program is voluntary, NERC staff’s review of the registered entities’ compliance history as an initial means to limit the pool for purposes of the instant analysis took into account violations that were subject to mandatory reporting obligations under the NERC Reliability Standards, as well as any that were self-identified by registered entities.
4 This analysis considered PVs in any disposition track, except dismissals. A dismissal of a PV may be due to a duplicate of a pending PV or the PV was never a violation of a Reliability Standard.
5 Currently, there are 922 GOs and 879 GOPs on the NERC Compliance Registry.
emergency situations (e.g., designated black-start resources). However, an individual entity’s facts and circumstances could be considered by the NERC-led review panel.⁶

The second group of 38 TOs and/or TOPs were identified by NERC staff that had not contributed to an event and had not received a PV from 2007 to the present date. At this time, NERC staff has determined there is not sufficient uniformity among the risk characteristics of these registered entities to create a group or groups with Phase II subset list of Reliability Standards for these functions. However, as with the GO/GOP functional entities above, an individual TO/TOP entity’s facts and circumstances could be considered by the NERC-led review panel.

If a class emerges as a result of the NERC-led review panel process or otherwise, either within the TO/TOP and GO/GOP functions or other functional registration categories, the Electric Reliability Organization (ERO) Enterprise⁷ may address such class in accordance within the recently enhanced NERC Rules of Procedure, including Appendices 5A and 5B.

⁶ Reduction in compliance obligations is considered at the registered entity level, not by unit.
⁷ The ERO Enterprise is comprised of NERC and the eight Regional Entities who have executed Regional Delegation Agreements with NERC.
Background

Events
NERC collects event information to analyze and evaluate potential patterns of risk in the BPS through the voluntary Events Analysis Process. Reportable events are categorized with levels of severity, ranging from Category 0 – Category 5.

As part of the Phase II effort, NERC staff analyzed events that resulted in unintended loss of load, System Operating Limit (SOL) or Interconnection Reliability Operating Limit (IROL) violations. These are considered Category 2 events according to the ERO Event Analysis Process. In addition, Category 1 events were also reviewed, including those that caused islanding.

Violations
NERC staff analyzed violations from a number of perspectives to identify a correlation between size of units and violations. Table 1 provides an overview for the number of entities that did not have any violations compared to the number of entities that have had a PV. Figures 1 – 4 below examines violations pertaining to generating units.

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<th>Count of GOP</th>
<th>Count of TO</th>
<th>Count of TOP</th>
<th>Count of GO</th>
<th>Count of GOP</th>
<th>Count of TO</th>
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</table>

Table 1 – Violations/No Violation by NERC Region (July 14, 2015)

8 Electric Reliability Organization Event Analysis Process – Version 2. See also n.3 supra.
9 This analysis included loss of load in qualified reportable events.
Background

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Figure 1 – Average and Total Unit Output by Fuel Type

No Violations by MW size

Figure 2 – Size Distribution (MW) of Generation Fleet per Entity with No Violations
Background

Violations by MW size

Figure 3 – Size Distribution (MW) of Generation Fleet per Entity with Violations

Figure 4 – Normalized Distribution of Generation Units with Violations compared to No Violations
Analysis
The first step in the analysis was to determine which entities from the four functions have not contributed to an event such as loss of load, SOL/IROL exceedance, or islanding. NERC staff analyzed over 700 reportable events dating back to 2007. Eighty percent of the events used in the analysis could be categorized as a loss of a combination of NERC-defined Elements or Facilities.

The second step was to determine which entities identified in step one have never received a PV. This analysis identified 112 GO/GOPs entities covering 412 units, and 38 TO/TOPs.

Finally, NERC staff identified the characteristics of entities that have not contributed to an event nor received a violation. The goal of this assessment was to determine whether there was a set of similar entities with consistent configurations or risks to identify a potential class of low-risk entities. These registered entities might be eligible for a reduced set of compliance obligations through a sub-set list of Reliability Standards.

GO/GOP: The first step in the analysis was to consider the nature and number of individual generating units. Four hundred and twelve (412) out of 8,525 units were identified that met the event and violation criteria. These units were then analyzed by type to determine their risk to BPS reliability. Following the risk analysis, the number of registered entities that would be affected was considered.\(^\text{10}\) Of the 412 units, 152 gas turbines (GT) units were the largest group, comprising over 37 percent of potentially lower-risk units.\(^\text{11}\) These units are owned or operated by 37 entities, nine of which own or operate units other than GTs, leaving 28 entities that solely own or operate GT units. The next largest group was 58 hydro units, 14 percent of the units analyzed, which are owned by six entities. The remaining generating units are divided among several different types of generators including 48 fossil-steam units owned by 21 entities (eight of which own other types of units), and 44 combined cycle units which are owned by 26 entities. Of note, three nuclear units, owned by three entities, and eight diesel units, owned by four entities, met the criteria. The percentages of registered entities that would be affected by a class are as follows:

- GTs – 28 registered entities or 3 percent
- Hydro – 6 registered entities or 0.7 percent
- Fossil-steam – 13 registered entities or 1.4 percent
- Combined cycle – 26 registered entities or 2.8 percent

However, other than GT units, no other type of units are operated by entities that contained a significant percentage comprising a single group of units with similar low-risk characteristics.

While this analysis did not assess why GT units made up the largest group, some possible hypothesis can made about these types of units and their potential differentiations. First, GTs are predominantly used during peak periods, and have short duration run times. In addition, GTs have low capacity factors, which reduces the potential for this type of unit to be involved in an event. These limited capacity factor entities could be considered a potential opportunity for defining a specific class, which may emerge through the NERC-led review panel process, but there are other characteristics for the GT units that should be considered.\(^\text{12}\) For example, these units are usually called upon at the most important times during an operating day to meet peak demand or emergency conditions. Thus, they may be critical of the reliable operation of the BPS. Second, GTs can be brought on-line or off-line in as little as ten minutes, so they have the ability to react before an SOL/IROL violation would occur providing potential mitigation options.

\(^\text{10}\) Currently, there are 922 GOs and 879 GOPs on the NERC Compliance Registry.
\(^\text{11}\) The units were identified as GTs units per the NERC GADS definition.
\(^\text{12}\) NERC staff is not recommending that such a class be defined at this time because, as discussed in more detail above, some of these units may need to be subject to the full set of Reliability Standards to adequately protect reliability.
Background

NERC staff developed a normalized curve of entities that have violations as compared to those that did not. See Figure 4. The normalized curve did not reveal a pattern or break point. In Figure 1, fuel types for GOs were reviewed at the unit level to determine if certain entities were a greater risk for violations than others. The only entities that showed any difference in the probability of violation were those that showed a sub-100 MW level of violations. Therefore, because of the differences, any difference in the probability of violation were not identified as being due to any characteristic among the identified TO/TOP entities

As shown in Figures 2-4, the violation data was also inconclusive in regards to using a MW bright-line to determine a GO/GOP registered entity’s risk. Comparing distributions of all units with their size and violation history (Figure 4), no trend appears in regards to violations and the size of a facility. Of the 314 GO/GOPs that have not contributed to events and have no PVs on record, approximately one-quarter of these functions have units under 100 MW (25.6%). This would seem to indicate that units under 100 MW would qualify as lower risk. However, entities that have violations also have a similar proportion of units at or under 100 MWs (19.5%). Because the data is inconclusive, the creation of a class based on lower MW levels at this time is not supported.

Therefore, NERC staff’s analysis did not identify a group of lower risk GO/GOP entities that would be candidates for a group eligible for a reduced set of compliance obligations through a sub-set list of Reliability Standards. Individual entities may pursue a reduction in compliance obligations through the NERC-led review panel established in Phase I of the RBR effort.

**TO/TOP:** The same criteria (did not contribute to an event and did not have a PV) was used to identify 38 potential TO/TOPs. These entities were examined to identify possible similarities or characteristics.

A majority (81.6 percent) of the TO/TOP entities were found to be embedded within a larger TOP. NERC staff considered a lower risk criteria for smaller TOs and TOPs that were performing limited TOP functions for a larger TOP as they were in a geographical area served by the larger TOP. NERC staff believes that this trait alone, however, does not necessarily include all risks associated with the entity, so each entity should be reviewed based on its own facts and circumstances.

For example, four of the entities embedded within a larger TOP could have an elevated risk profile based upon the characteristics of the respective entity. This elevated risk profile would exist due to potential impacts on other systems the entities would pose because of their location and multiple interconnection ties between RTOs. The assets under control of the entities were also reviewed, including potential load served and voltages at which the entity is interconnected. Eleven of the entities owned or controlled one or fewer transmission lines (six entities only own substations for generator interconnections). Only ten of the entities reviewed operate or own equipment greater than 200 kV, already limiting some compliance responsibilities such as requirements under FAC-003.

Therefore, because of the different characteristics among the identified TO/TOP entities13, no set of criteria emerged to identify a single group or groups of lower risk TOs/TOPs of significant size with common characteristics. Individual entities may be good candidates to pursue a reduction in compliance obligations through the NERC-led review panel established in Phase I of the RBR effort.

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13 This group actually comprises two distinct categories of TOs and/or TOPs: entities surrounded by a larger TO/TOP (which tend to own and operate relatively limited transmission facilities and do not perform TOP tasks for the larger TOP), and TO members of ISO/RTOs. This analysis did not attempt to distinguish between these two categories, which can be expected to have different risk profiles.
Observations and Recommendations

Observations

1. NERC staff believes that developing pro forma sub-set lists of Reliability Standards for lower risk GOs, GOPs, TOs and TOPs, as was done for UFLS-Only Distribution Providers, and pursuing wholesale Reliability Standard modifications are not feasible at this time.

2. NERC staff recommends that use of the Phase I processes and procedures is the most efficient and effective way to enable removal on an individual basis. These small sets of organizations may qualify for reduce compliance obligations, though individual facts and circumstances need to be considered
   a. NERC staff’s data analysis identified 28 GO/GOP potential entities.
   b. NERC staff identified 38 TO/TOP entities; however, their characteristics vary.

3. Violations are extremely low for the NERC Reliability Standards that were considered in evaluating eligibility as a group of lower risk GO/GOPs and TO/TOPs.

Recommendations

1. Use the NERC-led review panel to address an individual entity’s facts and circumstances to determine potential reduced compliance obligations.

2. Continue to monitor the results of the NERC-led review panel to identify consistent potential groups of entities that qualify for a sub-set of NERC Reliability Standards pursuant to the NERC’s recently enhanced Rules of Procedure supporting risk-based registration.

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14 Recent targeted modifications to increase the granularity of standards, by making them more risk-informed, have been successful (e.g., in the GO/TO effort), and similar modifications should, of course, continue to be considered by Standard Drafting Teams, as appropriate.