

**NERC**

NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

# PER-005 Standards White Paper

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**RELIABILITY | ACCOUNTABILITY**



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## Executive Summary

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A Personnel, Performance, Training, and Qualifications (PER) ad hoc group was formed to work with industry stakeholders to address five outstanding Federal Energy Regulatory Commission (FERC) directives.

The five outstanding FERC directives are as follows:

1. The Commission directs the Electric Reliability Organization (ERO) to develop specific requirements addressing the scope, content, and duration appropriate for Generator Operator (GOP) personnel (Order No. 693, P. 1363).
2. The Commission directs the ERO to develop a modification to PER-002-0 to require training of operations planning and operations support staff of Transmission Operators (TOPs) and Balancing Authorities (BAs) who have a direct impact on the reliable operation of the Bulk-Power System (BPS) (Order No. 693, P. 1372).
3. The Commission directs the ERO to consider personnel responsible for ensuring that critical reliability applications of the EMS, such as state estimator, contingency analysis and alarm processing packages, are available, up to date in terms of system data and produce useable results that can also have an impact on the reliable operation of the BPS (Order No. 693, P. 1373).
4. The Commission directs the ERO to consider the necessity of developing a similar implementation plan with respect to PER-005-1, Requirement R3.1 (Order No. 742, P. 24).
5. The Commission directs the ERO to develop through a separate reliability standards development project formal training requirements for local transmission control center operator personnel, and to develop a definition of “local transmission control center” in the standards development project (Order No. 742, P. 64).

The ERO is required to comply with FERC directives unless there is an equally effective and efficient method of addressing the reliability concern, or if there is evidence that the directive has been overcome by events or is no longer needed. These five directives were challenging due to the variance of industry opinion.

The PER informal development project reviewed the FERC directives, conducted outreach to industry stakeholders, and developed the pro forma standard. There were differing opinions from industry; some stated that the directives should be complied with while others stated there was sufficient justification as to why the directives were no longer needed. Although persuasive, the majority of the arguments as to why the directives were no longer needed had been addressed by FERC in prior orders as outlined in Appendix A. The discussion for each of the above directives are summarized as follows.

First, discussions were held regarding GOP dispatchers at a local control center. Through industry feedback, it became apparent that stakeholders needed a better understanding of the types of GOPs FERC was including in the directive. Initially it appeared that the directive would apply only to those GOPs that make independent decisions; however, FERC had addressed that narrow reading in FERC Order 693 P. 1359. The group’s final determination was that even though GOPs at a local control center receive direction from their BA or TOP, those that take direction and then develop dispatch instructions for their plant operators are the specific GOPs the FERC Orders are attempting to capture. Therefore, the pro forma standard expanded the applicability in PER-005 to include these specific types of GOPs.

Second, the ad hoc group received strong feedback from industry that operations planning and operations support staff should not be included in the PER standard. Some of the reasons presented were: the System Operator is the one who impacts the Bulk Electric System (BES) and not the support personnel; support personnel do not make any Real-time decisions on BES operations; mandating training would distract training staff from the more critical functions of training System Operators; and this would create an administrative burden and would be too costly of a task on industry for the reliability protection it offers. Through further research it was determined that these were the same arguments previously presented and responded to by FERC in Orders 693 and 742 (see Appendix A). Therefore, as the informal development effort was not able to provide an argument that had not previously been rejected by FERC, the ad hoc group continued with the inclusion of support personnel in PER-005.

The third major discussion was in regard to the directive for the ERO to consider including personnel responsible for ensuring that critical reliability applications of the EMS, such as state estimator, contingency analysis and alarm processing packages, are available, up-to-date in terms of system data and produce useable results can also have an impact on the reliable operation of the BPS. Similar to the previously described discussions, many of the arguments had been addressed by FERC, but there was new evidence in this area. The argument for not including EMS personnel in the training standard at this time is based on a report provided by the Event Analysis Subcommittee (EAS). The EAS worked with the NERC Event Analysis (EA) staff to review the events that have been cause-coded since October 2010. The database has over 263 events; 208 of them were cause-coded to allow for trending and cluster analysis. The EAS and NERC EA staff queried the 208 events and looked in particular for cause codes that pertain to human errors and training that were less than adequate. The query produced 44 events that had the possibility for human errors or training being a contributing factor in the event. An analysis of those 44 events indicated that only 10 had human error or training as a contributing factor. Six of those 10 events were related to the loss of EMS or SCADA. Out of the six events, only two were deemed to be a training issue. Therefore, based on the information, the EAS and PER ad hoc group do not believe it is necessary at this time to require EMS support personnel to receive the level of training required of a BA, Reliability Coordinator (RC), and TOP by NERC standard PER-005.

Fourth, the ad hoc group and industry stakeholders agreed with the Commission on developing an implementation plan with respect to the simulation technology requirement. The ad hoc group determined that six months would suffice for an entity to become compliant with the simulation technology requirement in PER-005. No feedback has been received thus far from industry regarding this suggested change.

Last, the group addressed the local transmission control center directive by expanding the PER-005 applicability section to Transmission Owners (TO) and creating a standard-only definition. The group defined "local transmission control center" in the standard as *personnel in a transmission control center who operate a portion of the Bulk Electric System at the direction of its Transmission Operator*. This term will not become a part of the NERC Glossary of Terms used in NERC Reliability Standards at this time.

In summary, the PER ad hoc group created a pro forma standard (PER-005-2) extending the applicability to certain GOPs, support personnel, and TOs, excluding EMS support personnel. The 32-hour requirement has been removed as it is inherent to the systematic approach to training that training hours should be left up to each entity. The requirement for 32 hours of training meets the Paragraph 81 criteria for redundancy and was further not a results-based requirement and considered unnecessarily prescriptive. A new requirement R3.1 was created to develop the implementation of the simulation technology requirement.

The pro forma standard was drafted to provide maximum flexibility to industry while addressing the reliability concerns in the FERC directives. Under the pro forma standard, each entity has the ability to identify its reliability-related tasks, determine which of its personnel conduct those tasks, and determine the appropriate training and level of training for each employee. The ad hoc group understood the concerns from industry regarding the systematic approach to training, and each requirement has been left up to the entity to decide which approach should be used.

## Purpose

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The purpose of the PER-005 white paper is to provide the issues, rationale, and support for the revisions to the PER-005 standard. This white paper provides an explanation of how each of the FERC directives was addressed, including the issues that were raised during informal development and the rationale for proceeding or not proceeding with each. This paper will also provide technical justification and support for the revisions to the standard. The contents in this paper will provide the standard drafting team with the basis for the pro forma standard so they can begin the formal standard development process.

## History of the PER-005 Informal Development

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In February 2012, the North American Electric Reliability Corporation (NERC) Board of Trustees (Board) formed the Standards Process Input Group (SPIG) to address the widespread frustration with the duration of the standards development process.<sup>1</sup> In May 2012, SPIG submitted a report to the NERC Board recommending improving both the timeliness and quality of the standards. The process manual changes were approved by the Board in February 2013.<sup>2</sup> Since then, the Board issued a resolution requesting SPIG, the Members Representative Committee (MRC), NERC staff, and industry stakeholders to reform their standards development paradigm. Changes were integrated into the 2013–15 Reliability Standards Development Plan (RSDP) and Standards Committee (SC) Strategic Plan.<sup>3</sup>

The evolving standards process includes an informal development period in which NERC Standards developers work with an ad hoc group to gather information up front from industry regarding the FERC directives or other standards development project. There are three approaches to consider when addressing FERC directives: comply with the FERC directive, present an equally and effective alternative, or provide technical justification as to why the directive is no longer needed.

A PER ad hoc group was formed in January of 2013 to work with industry stakeholders to address five outstanding FERC directives. The ad hoc group addressed each directive through informal development, with the goal of filing a revised standard with FERC by December 31, 2013.

The PER ad hoc group held its first informal development meeting February 25–27, 2013, in Atlanta, Georgia. A small ad hoc group of industry subject matter experts (SMEs) representing RCs', BAS', GOPs', TOPs', and TOs' participated in discussions about the FERC directives and possible resolutions to address them. The ad hoc group created the first draft of a pro forma standard to address each directive. The ad hoc group conducted conference calls, workshops, and, to reach additional industry participants, two webinars: a March 15 informational webinar and an April 4 industry feedback webinar requesting feedback from industry regarding the PER ad hoc group suggestions. Multiple conference calls were held with the ad hoc group to keep all members aware of feedback received.

A second informal meeting was held April 22–23, 2013, at NERC's Atlanta office. The meeting was a continuation of the efforts of the first meeting with the addition of discussion on the information received through the outreach efforts. The ad hoc group discussed issues raised by industry and revised the pro forma standard based on that information. The group presented the revised pro forma standard to industry at the May 31 industry feedback webinar and other conference calls. During the webinar, polling questions were presented to participants, and 147 out of 323 people participated in the polling. The purpose of this polling was to gauge industry's support of the suggested PER-005 standard.

The last informal development meeting was held June 20–21, 2013 to develop the materials necessary to move into the formal process. This will entail submitting a Standard Authorization Request (SAR), the pro forma standard, input to a reliability standards audit worksheet (RSAW), an implementation plan, a mapping document, and a technical white paper to the NERC Standards Committee (SC).

A complete list of entities that participated during the informal development can be located in Appendix B.

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<sup>1</sup> May 9, 2012 NERC Board minutes: [http://www.nerc.com/gov/bot/Agenda%20Minutes%20and%20Highlights%20DL/2012/BOT\\_050912m\\_complete.pdf](http://www.nerc.com/gov/bot/Agenda%20Minutes%20and%20Highlights%20DL/2012/BOT_050912m_complete.pdf)

<sup>2</sup> August 16, 2012 NERC Board minutes: <http://www.nerc.com/gov/bot/Agenda%20Minutes%20and%20Highlights%20DL/2012/0-BOT08-12a-complete.pdf>

<sup>3</sup> 2013–15 Reliability Standards Development Plan: [http://www.nerc.com/pa/Stand/Standards%20Development%20Plan%20Library/2013-2015\\_RSDP\\_BOT\\_Approved\\_12-19-12.pdf](http://www.nerc.com/pa/Stand/Standards%20Development%20Plan%20Library/2013-2015_RSDP_BOT_Approved_12-19-12.pdf)

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## Outstanding FERC Directives and Technical Discussions

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There are five outstanding FERC directives from Order 693<sup>4</sup> and Order 742.<sup>5</sup> Each directive was discussed in detail during the informal development stage, and below are the summaries of the discussions.

### Applicability of the PER Standard to GOP Dispatchers

#### FERC Order 693 ¶ 1360-1361, 1363

**P. 1360.** We agree with FirstEnergy and others that some clarification is required regarding which generator operator personnel should be subject to formal training under the Reliability Standard. As noted above, a generator operator typically receives instructions from a balancing authority. Some generator operators are structured in such a way that they have a centrally-located dispatch center that receives direction and then develops specific dispatch instructions for plant operators under their control. For example, a balancing authority may direct a centrally-located dispatch center to deliver 300 MW to the grid, and the dispatch center would determine the best way to deliver that generation from its portfolio of units. In this type of structure, it is the personnel of the centrally located dispatch center that must receive formal training in accordance with the Reliability Standard. Plant operators located at the generator plant site also need to be trained but the responsibility for this training is outside the scope of the Reliability Standard.

**P. 1361.** Other generator operators may be structured in such a way that the dispatch center and the single generation plant are at the same site. In this structure as well, some personnel will perform dispatch activities while others are designated as plant operators. Again, it is the dispatch personnel that must receive formal training in accordance with the Reliability Standard. Plant operators also need to be trained but the responsibility for this training is outside the scope of the Reliability Standard.

**P. 1363.** Further, the Commission agrees with MidAmerican, SDG&E and others that the experience and knowledge required by transmission operators about Bulk-Power System operations goes well beyond what is needed by generation operators; therefore, training for generator operators need not be as extensive as that required for transmission operators. Accordingly, the training requirements developed by the ERO should be tailored in their scope, content and duration so as to be appropriate to generation operations personnel and the objective of promoting system reliability. Thus, in addition to modifying the Reliability Standard to identify generator operators as applicable entities, we direct the ERO to develop specific Requirements addressing the scope, content and duration appropriate for generator operator personnel.

#### FERC Order 742 ¶ 83-84

**P. 83.** EPSA requests clarification of several statements in the NOPR regarding the Order No. 693 directive related to expanding the applicability of the system operator training Reliability Standard to include certain generator operators. First, EPSA expresses concern that the NOPR discussion broadly addresses generator operator personnel in a way that could be construed as subjecting all generator operator personnel, regardless of the disposition of the generating unit and how it fits into the grid and the topology of the grid, to the system operator training requirements. Therefore EPSA seeks clarification that the Commission did not intend for the NOPR to expand the Order No. 693 directives. We confirm that we have not modified the scope of applicability of the Order No. 693 directive regarding generator operator training. As described in Order No. 693, the directive applies to generator operator personnel at a centrally-located dispatch center who receive direction and then develop specific dispatch instructions for plant operators under their control. Those generator operator personnel must receive formal training of the nature provided to system operators under PER-005-1. As clarified in Order No. 693, this group of personnel would include a generator operator's dispatch personnel where a single generator and dispatch center are located at the same site.

**P. 84.** EPSA also seeks clarification regarding the statement in the NOPR that: "[I]n the event communication is lost, the generator operator personnel must have had sufficient training to take appropriate action to ensure reliability of the Bulk-Power System." EPSA expresses concern that this statement suggests that if communication is lost with the grid operator, the generator operator must take unilateral action for which it requires training. EPSA notes that generator operators do not take such unilateral action nor do they have access to information to make such decisions. Therefore, EPSA asks the Commission to make clear that while communication should be addressed in training requirements for centrally located generator operator dispatch employees, the Commission is not extending related responsibilities or training requirements to generator operator employees. We grant the requested clarification, and affirm that we are not modifying the Order No.

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<sup>4</sup> *Mandatory Reliability Standards for the Bulk-Power System*, 118 FERC ¶ 61,218, FERC Stats. & Regs. ¶ 31,242 (Order No. 693), *order on reh'g, Mandatory Reliability Standards for the Bulk-Power System*, 120 FERC ¶ 61,053 (Order No. 693-A) (2007).

<sup>5</sup> FERC Order 742 PP 83-84

693 directive regarding training for certain generator operator dispatch personnel, nor are we expanding a generator operator's responsibilities.

### Consideration of Directive

The PER ad hoc group considered all options (such as complying with the FERC directive, presenting an equally and effective alternative, or providing technical justification as to why the directive is no longer needed) when addressing GOPs at a centrally located dispatcher center who receive direction and then develop specific dispatch instructions for plant operators under their control.<sup>6</sup> The ad hoc group suggested a revised PER-005-1 standard that expands the applicability section to these specific GOPs, leaving it up to the entity to identify the reliability-related tasks its GOP personnel should be trained on. The group attempted to draw a bright line of GOPs that make independent decisions. Through subsequent discussions with FERC's OER staff, the group learned that this bright line, per the FERC orders, would not address the FERC directive. It appears that the intent of the FERC order is for GOPs at a control center who receive direction from their BAs or TOPs to develop specific dispatch instructions (not just that make an independent decision) for their plant operator. These are the people who should be captured under the standard. The group considered and suggested a revised PER-005 that extends applicability to these specific GOPs. The standard language allows the entity to decide which systematic approach to training should be used when training GOPs and includes coordination on training topics with the entity's RC, BA, TOP, and TO.

### Technical Discussions

Many technical discussions were held regarding increasing the applicability of the PER standard to GOP dispatchers. The feedback provided in the list below are the reasons provided by industry as to why this directive was no longer needed for GOP dispatchers.

- All decisions that GOPs make that impact the reliability of the BES must be approved by the BA, TOP, or RC. Even in the case of an emergency situation, the GOP will not make any decisions until approved by the BA, TOP, or RC. It was further explained that there are GOPs that do not develop dispatch instruction and simply take the information received from the BA, TOP, or RC and relayed information directly to the plant operator.
- FERC limited emergency shutdowns of generation to occur at the plant level, not the dispatch level; at this time, the FERC order does not require plant operators to be trained.
- The NERC Functional Model was stated many times as a reason to show that GOP dispatchers follow the direction of the BA or TOP. The NERC Functional Model for GOPs states that GOPs in Real time:
  - Provide Real-time operating information to the Transmission Operators and the required Balancing Authority.
  - Adjust real and reactive power as directed by the Balancing Authority and Transmission Operators.<sup>7</sup>
- When a GOP would be making decisions that impact reliability, they are also registered as the BA or TOP.

Entities that agreed with GOPs being added to the standard made the following comments:

- Consider including some criteria regarding various sizes of generation like in CIP Version 5.
- Consider creating a new standard addressing GOP dispatchers.
- PPL Electric Utilities Corp., Louisville Gas and Electric Co., and PPL Generation LLC stated that the TOP or BA should prepare the GOP training modules since the goal is to ensure that dispatchers do what the TOP or BA wants in emergency situations.

The arguments provided above constitutes the same arguments that FERC rejected in Order Nos 693 and 742 (see Appendix A).

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<sup>6</sup> FERC Order 742 P 83.

<sup>7</sup> NERC functional model: <http://www.nerc.com/pa/Stand/Resources/Documents/FunctionalModelTechnicalDocumentV5Clean2009Dec1.pdf>



FERC Order 693 P. 1393 clearly states that GOP dispatchers need to be trained using the systematic approach to training methodology.

1393. Accordingly, the Commission approves Reliability Standard PER-002-0. In addition, pursuant to section 215(d)(5) of the FPA and § 39.5(f) of our regulations, the Commission directs the ERO to develop a modification to PER-002-0 through the Reliability Standards development process that: (1) identifies the expectations of the training for each job function; (2) develops training programs tailored to each job function with consideration of the individual training needs of the personnel; (3) expands the Applicability section to include (a) reliability coordinators, (b) local transmission control center operator personnel (as specified in the above discussion), **(c) generator operators centrally-located at a generation control center with a direct impact on the reliable operation of the Bulk-Power System and** (d) operations planning and operations support staff who carry out outage planning and assessments and those who develop SOLs, IROLs or operating nomograms for Real-time operations; **(4) uses the Systematic Approach to Training (SAT) methodology in its development of new training programs** and (5) includes the use of simulators by reliability coordinators, transmission operators and balancing authorities that have operational control over a significant portion of load and generation.<sup>8</sup>

The pro forma standard is written to require the use of a Systematic Approach to Training, but provides the entity the ability to determine the reliability-related tasks GOP dispatchers need to be trained on and the method of how the GOP dispatchers are trained.

There were discussions regarding whether training for GOPs should be in a separate standard, however the current PER-005 is a systematic approach to training based standard and thus it is logical to include the GOP dispatchers within the current standard.

Because the ad hoc group received the same feedback that was provided in FERC Order Nos. 693 and 742; the ad hoc group suggested expanding the applicability section in PER-005 to capture these certain GOP dispatchers using the systematic approach to training, which is left up to the entity.

## Applicability of the PER Standard to Operations Planning and Operations Support Staff

### FERC Order 693 ¶ 1366

P. 1366. As mentioned above, the Commission proposed in the NOPR to direct the ERO to develop a modification to PER-002-0 to require training of operations planning and operations support staff of transmission operators and balancing authorities who have a direct impact on the reliable operation of the Bulk-Power System.<sup>9</sup>

### FERC Order 742 ¶ 82

P. 82. Associated Electric expressed concern that the NOPR definition of the “operations planning and operations support staff” who should receive training pursuant to the Order No. 693 directive is “broad and will encompass operations planning and operation support staff who engage in tasks that do not directly affect the reliable operation of the bulk electric system.” The Commission clarifies that the scope of the Reliability Standard or modification to a Reliability Standard to address training for “operations planning and operations support staff” is limited by the qualifications stated in Order No. 693. Specifically, in Order No. 693, the Commission directed the ERO to develop a modification to PER-002-0 that extends applicability of the training requirements to the operations planning and operations support staff of transmission operators and balancing authorities. The Commission further clarified that such directive applies only to operations planning and operations support personnel who: “carry out outage coordination and assessments in accordance with Reliability Standards IRO-004-1 and TOP-002-2, and those who determine SOLs and IROLs or operating nomograms in accordance with Reliability Standards IRO-005-1 and TOP-004-0.” The NOPR did not expand or alter the scope of this directive as set forth in Order No. 693.<sup>10</sup>

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<sup>8</sup> FERC Order 693 P 1363.

<sup>9</sup> FERC Order 693 P 1366.

<sup>10</sup> FERC Order 742 P 82.

## Consideration of Directive

The PER ad hoc group held multiple discussions regarding the impact that operations planning and operations support staff have on the BES. The feedback received from industry regarding this topic was deemed to be the same arguments provided in the NOPR and rejected in FERC Orders 693 and 742 (see Appendix A). Therefore, the ad hoc group revised PER-005-1 to incorporate operations planning and support personnel in the standard.

## Technical Discussions

Industry provided the following information regarding operations planning and operations support staff about why training is not needed for support personnel:

- Training will provide no reliability benefit because of the administrative burden on entities and costly burden on industry with uncertain benefits.
- Training will provide no reliability impact because System Operators make the final decision, and support personnel do not make Real-time decisions.
- Operations planning and planning support staff is ambiguous and should be clarified.
- Entities appear to already train their support personnel; therefore, it should not be a mandatory requirement.

Again, the feedback received was deemed to be the same arguments provided on FERC Orders 693 and 742; therefore, the ad hoc group revised PER-005-1 to incorporate operations planning and support personnel in the standard.

## Applicability of the PER Standard to EMS Personnel FERC Order 693 ¶ 1373

1373. In addition, the Commission is aware that the personnel responsible for ensuring that critical reliability applications of the EMS, such as state estimator, contingency analysis and alarm processing packages, are available, up-to-date in terms of system data and produce useable results can also have an impact on the Reliable Operation of the Bulk-Power System. Because these employees' impact on Reliable Operation is not as clear, we direct the ERO to consider, through the Reliability Standards development process, whether personnel that perform these additional functions should be included in mandatory training pursuant to PER-002-0.<sup>11</sup>

## Consideration of Directive

Through discussion with industry, the ad hoc group determined that the report provided by the Event Analysis Subcommittee (EAS) serves as rationale for why EMS personnel should not be included in the PER standard at this time. The technical discussion section below provides more in-depth information regarding this determination.

## Technical Discussions

As background, in Orders 693 and 742, the Commission directed NERC to consider whether there is a need to include EMS personnel in the training standard. In contrast to the directive for GOPs and operations support personnel, FERC did not conclude that it was necessary to include EMS personnel in the standard; rather, it directed the ERO to consider EMS personnel inclusion. The ad hoc group discussed the issue with industry stakeholders and concluded that the data does not support a need to include EMS personnel in the standard at this time.

Based on the information in the EMS report on cause-coded events, the EAS and PER ad hoc group do not believe it is necessary at this time to require EMS support personnel to receive the level of training required of a BA, Reliability Coordinator (RC), and TOP by NERC Reliability Standard PER-005.

Lastly, the EMS events will continue to be monitored, and if EMS events begin to indicate that training is a root or contributing cause, NERC will readdress inclusion of EMS personnel to PER-005. A request will be submitted to the Operating Committee (OC) to produce an EMS guideline for training EMS personnel.

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<sup>11</sup> FERC Order 693 P 1373.

## New Simulation Technology Implementation Plan FERC Order 742 ¶ 24

With respect to EEI's comment regarding the effective date for entities that may become subject to the simulator training requirement in PER-005-1 R3.1, the Commission believes that this issue should be considered by the ERO. We note that, with respect to the Critical Infrastructure Protection (CIP) Reliability Standards, NERC has developed a separate implementation plan that essentially gives responsible entities some lead time before newly acquired assets must be in compliance with the effective CIP Reliability Standards. **We direct NERC to consider the necessity of developing a similar implementation plan with respect to PER-005-1, Requirement R3.1.**<sup>12</sup>

### Consideration of Directive

The PER ad hoc group was in agreement that a new subrequirement 3.1 should be developed in the PER-005 standard to address entities that may become subject to simulator training in the future. Further discussion was held regarding the best time frame for entities to become compliant, and the general consensus was that six months is a reasonable timeframe. This information was presented at webinars, conferences, and face-to-face meetings, and no feedback was received regarding the implementation plan of simulator training for entities.

### Technical Discussions

The ad hoc group did not receive feedback regarding the implementation plan for simulation technology.

## Applicability of the PER Standard to Local Transmission Control Center FERC Order 742 ¶ 64

Accordingly, we adopt our NOPR proposal and direct the ERO to develop through a separate Reliability Standards development project formal training requirements for local transmission control center operator personnel. Finally, given the numerous comments stating that term "local transmission control center" should be defined, we direct NERC to develop a definition of "local transmission control center" in the standards development project for developing the training requirements for local transmission control center operator personnel. We will not evaluate Associated Electric's proposed definition but, rather, leave it to the ERO to develop an appropriate definition that reflects the scope of local transmission control centers. The Commission will not opine on the appropriate definition of local transmission control center, as this definition can be addressed first using NERC's Reliability Standards Development Procedures.

### Consideration of Directive

The ad hoc group considered whether to define local transmission control center in the NERC Glossary of Terms or create a standard-only definition. The group defined "local transmission control center" by extending the PER standard applicability to TOs and developing a definition that only applies to the PER standard. The suggested TO standard-only definition is *personnel in a transmission control center who operate a portion of the BES at the direction of its Transmission Operator.*

### Technical Discussions

The group did not receive many comments regarding expanding formal training for local transmission control center operator personnel and defining local transmission control center. The group suggested a revision to PER-005-1 and created a standard-only definition of "local transmission control center."

## Other Issues

### Inconsistent usage of "each calendar year," "annual," and "at least every twelve months"

The PER ad hoc group changed all terms (such as "annual" and "at least every twelve months") to "each calendar year" due to "each calendar year" being better defined than the other two terms.

## Definitions

### System Operator

A SAR was submitted for GOPs to be removed from the System Operator definition. The ad hoc group removed the term and suggested a revised definition. The suggested definition is as follows: *An individual at a eControl eCenter (Balancing*

<sup>12</sup> FERC Order 742 P 64

~~Authority, Transmission Operator, Generator Operator, Reliability Coordinator) whose responsibility it is to monitor and control who operates or directs the operation of the Bulk eElectric sSystem in Real time.~~

### **System Personnel**

The term "System Personnel" was created as a standard-only definition for PER-005. The purpose of this definition is to capture certain applicable entities within the requirement instead of having to type each one out individually, multiple times, in a requirement. The suggested definition is as follows: *System Operators of a Reliability Coordinator, Transmission Operator, or Balancing Authority, and the Transmission Owner personnel described in the Applicability Section of this standard.*

### **Support Personnel**

The term "System Personnel" was created as a standard-only definition for PER-005. The purpose of this definition is to capture certain applicable personnel within the requirement as a group for clarity. The suggested definition is as follows: *Individuals who carry out outage coordination and assessments, or determine SOLs, IROLs, or operating nomograms for Real-time operations.*

## Conclusion

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The informal development initiative provided key discussions regarding the outstanding PER FERC directives. This white paper encapsulates all of the components of what is needed for the Standards Committee to act on, discuss, and ultimately authorize the PER Standard Authorization Request.

## Appendix A: Industry Arguments and FERC Responses

The below table shows initial arguments received from industry regarding FERC Orders 693 and 742. Also shown below are the arguments received from industry to-date that are deemed to be the same arguments found in both orders.

EXTENDING APPLICABILITY TO GOPS				
Industry Comment	Order Cite	FERC Response	Order Cite	Phase 2 Industry Comment
<p><u>Clarification of Applicable GOPs</u></p> <p>Many commenters requested clarification as to which GOPs needed to be trained:</p> <ol style="list-style-type: none"> <li>1) FirstEnergy supported GOP training but noted there was some confusion over the GOP classification, which is sometimes used to refer to dispatch personnel (or fleet operators at a control center) and other times used to refer to a plant or unit operator. FirstEnergy requested that the Commission direct NERC to recognize this distinction.</li> <li>2) California PUC, Nevada Companies, Reliant, Dynegy, MISO, and Wisconsin Electric all presented various arguments as to why training should not be extended to plant operators. These entities did not argue against application of the training standard to dispatch personnel.</li> </ol>	<p>Order No. 693 at PP. 1350, 1352-54</p>	<p>FERC clarified that the directive to train GOPs only applies to GOPs located at a dispatch center that receives direction and then develops specific dispatch instructions for plant operators under their control.</p> <p>FERC clarified that plant operators need not be trained under the standard.</p>	<p>Order No. 693 at PP. 1360-61</p> <p>See also Order No. 742 at P. 83.</p>	

EXTENDING APPLICABILITY TO GOPS				
Industry Comment	Order Cite	FERC Response	Order Cite	Phase 2 Industry Comment
<p><u>Decision-Making Arguments</u></p> <p>A number of commenters, including Xcel, argued that GOPs need not be trained because they do not make independent decision. They argued that GOPs simply take their direction from Transmission Operators, Balancing Authorities, and Reliability Coordinators, which limits their ability to exercise independent action impacting the reliability of the Bulk-Power System.</p>	<p>Order No. 693 at PP. 1351; 1354</p>	<p>FERC rejected this argument, stating:</p> <p>“Xcel and others oppose extending the applicability of PER-002-0 to generator operators, because they take directions from balancing authorities and others, which limits their ability to impact reliability. Although a generator may be given direction from the balancing authority, it is essential that generator operator personnel have appropriate training to understand those instructions, particularly in an emergency situation in which instructions may be succinct and require immediate action. Further, if communication is lost, the generator operator personnel should have had sufficient training to take appropriate action to ensure reliability of the Bulk-Power System. Thus, we direct the ERO to develop a modification to make PER-002-0 applicable to generator operators.</p>	<p>Order No. 693 at P. 1359</p>	<p><u>Decision-Making Arguments</u></p> <p>A number of commenters, through verbal conversations and the chat feature during PER webinars, stated that all decisions that GOPs make that impact the BES must be approved by BA, TOP, or RC have the final say in the decisions being made.</p>

EXTENDING APPLICABILITY TO GOPS				
Industry Comment	Order Cite	FERC Response	Order Cite	Phase 2 Industry Comment
<p><u>No Reliability Benefit Argument</u></p> <p>Entergy, Xcel and Nevada companies further argued that generator operator training will provide limited benefit. Entergy further stated that that expanding the applicability to generator operators would provide little benefit to those personnel in the performance of their own functions, and could distract them from those functions.</p>	Order No. 693 at P. 1351; 1357	FERC disagreed, stating that with the limitation of training to dispatch personnel, “the benefits to the Bulk-Power System will be maximized and the cost of formal training limited.”	Order No. 693 at P. 1362	<p><u>No Reliability Benefit Argument</u></p> <p>Creating training for GOPs will be costly and provide no benefit.</p>
<p><u>Scarcity of Resources and Cost Argument</u></p> <p>Entergy argued that training would be extremely costly and would divert necessary resources from more important reliability objectives.</p> <p>TAPS also opposed the expanded applicability, especially in the case of small systems, because it believes that the requirement would be costly with no benefits to reliability.</p>	Order No. 693 at P. 1351; 1357	See above. FERC rejected these arguments, stating that the limitation to dispatch personnel would limit the cost of training.	Order No. 693 at P. 1362	<p><u>Scarcity of Resources and Cost Argument</u></p> <p>A number of commenters, through verbal conversations and the chat feature during PER webinars stated that it will be costly to train GOPs. Smaller entities state it will be a costly to provide training to their GOPs and no major benefits will appear.</p>
<p><u>Scope of Training Arguments</u></p> <p>Many commenters discussed the scope of training for GOPs, arguing that the scope, content, and duration needs to be limited and tailored to their functions.</p>	Order No. 693 at P. 1356	FERC agreed, stating that training for Generator Operators need not be as extensive as that required for Transmission Operators, and the training requirements developed by the ERO should be tailored in their scope, content, and duration so as to be appropriate to Generation Operations personnel and the objective of promoting system reliability.	Order No. 693 at P. 1363	<p><u>Scope of Training Arguments</u></p> <p>Concerns about GOPs that do not develop dispatch instructions will be captured regardless.</p>



EXTENDING APPLICABILITY TO GOPS				
Industry Comment	Order Cite	FERC Response	Order Cite	Phase 2 Industry Comment
<p><u>Size Limitation Arguments</u></p> <p>APPA, TAPS, and the Process Electricity Committee requested a size limitation, arguing that while a generator plays an important role in the reliable operations of the Bulk Electric System, the Generator Operator takes commands from the Rransmission Operator, Balancing Authority, or Reliability Coordinator. Without a size limitation, the standard would require many small generators to enroll in a training program.</p>	Order No. 693 at P. 1357	FERC responded that concerns regarding the need for a size limitation on Generator Operators should be satisfied by FERC’s determination that the applicability of particular entities should be determined based on the ERO compliance registry criteria.	Order No. 693 at P. 1357	<p><u>Size Limitation Arguments</u></p> <p>Comments received stated that a size limitation needs to be captured like CIP V5.</p>
<p>In response to the Order No. 742 NOPR, a number of commenters challenged the need for the directive.</p>	Order No. 742 at P. 79	FERC rejected these arguments as beyond the scope of Order No. 742 and as collateral attacks on the ruling in Order No. 693 and refused to address the arguments again.	Order No. 742 at PP. 79, 81	

EXTENDING APPLICABILITY TO GOPS				
Industry Comment	Order Cite	FERC Response	Order Cite	Phase 2 Industry Comment
<p><u>EPSA Clarification</u></p> <p>EPSA sought clarification regarding the statement in the NOPR, “[I]n the event communication is lost, the generator operator personnel must have had sufficient training to take appropriate action to ensure reliability of the Bulk-Power System.” EPSA expressed concern that this statement suggests that if communication is lost with the grid operator, the Generator Operator must take unilateral action for which it requires training. EPSA notes that Generator Operators do not take such unilateral action, nor do they have access to information to make such decisions. EPSA asks the Commission to make clear that while communication should be addressed in training requirements for centrally located Generator Operator dispatch employees, the Commission is not extending related responsibilities or training requirements to Generator Operator employees.</p>	<p>Order No. 742 at P. 84</p>	<p>FERC granted the requested clarification and affirmed that it did not modify the Order No. 693 directive regarding training for certain Generator Operator dispatch personnel, nor expand a Generator Operator’s responsibilities.</p>	<p>Order No. 742 at P. 84</p>	

EXTENDING APPLICABILITY TO SUPPORT PERSONNEL				
Industry Comment	Order Cite	FERC Response	Order Cite	Phase 2 Industry Comments
<p><u>No Reliability Benefit</u></p> <p>EI states that the extension of the applicability to “operations support personnel” could result in a dramatic expansion of industry training requirements with uncertain benefits to system reliability.</p>	Order No. 693 at P. 1368	FERC stated that because it is limiting training of support personnel to those who carry out outage coordination and assessments and those who determine SOLs and IROLs or operating nomograms, the directive is limited to those with a direct impact on reliability.	Order No. 693 at P. 1374	<p><u>No Reliability Benefit</u></p> <p>A number of commenters, through verbal conversations and the chat feature during PER webinars, stated that expanding PER-005 applicability to support personnel will capture a variety of people who do not impact the BES.</p>
<p><u>TOP makes decision</u></p> <p>Entergy argued that it is unnecessary to require all staff supporting the Transmission Operator to be trained in the Transmission Operator’s Reliability Standards responsibilities, because as long as the supporting personnel work under the direction of a NERC-certified Transmission Operator, there is no need for duplicative training for supporting personnel.</p>	Order No. 693 at P. 1370	FERC stated that because it is limiting training of support personnel to those who carry out outage coordination and assessments and those who determine SOLs and IROLs or operating nomograms, the directive is limited to those with a direct impact on reliability.	Order No. 693 at P. 1374	<p><u>TOP makes decision</u></p> <p>A number of commenters, through verbal conversations and the chat feature during PER webinars, stated that decisions are made by the NERC-Certified System Operators.</p>
<p><u>Administrative Burden</u></p> <p>APPA expressed concern about expanding the applicability to operations planning and operations support staff, especially if the Commission adopts its proposed interpretation of the Bulk Electric System, because this would become quite onerous for small utilities.</p>	Order No. 693 at P. 1368	FERC limited the scope of what support personnel must be trained and clarified that training for support personnel should be tailored to the functions they perform and need not be trained to the same extent as Transmission Operators.	Order No. 693 at P 1375	<p><u>Administrative Burden</u></p> <p>A number of commenters, through verbal conversations and the chat feature during PER webinars, stated that this would be a huge administrative burden regarding the SAT process.</p>

EXTENDING APPLICABILITY TO SUPPORT PERSONNEL				
Industry Comment	Order Cite	FERC Response	Order Cite	Phase 2 Industry Comments
<p><u>Directive is Ambiguous</u></p> <p>Wisconsin Electric argued that the Commission’s proposal does not address how to identify the operations planning and operations support personnel who would be subject to the Reliability Standard and how to develop compliance measures for them. It contended that the proposed modification is ambiguous and should not be implemented.</p> <p>Northern Indiana also argued that the terms “operations planning” and “operations support staff” should be clarified.</p>	Order No. 693 at P. 1368	<p>FERC clarified that the support personnel who need to be trained are those who carry out outage coordination and assessments in accordance with Reliability Standards IRO-004-1 and TOP-002-2, and those who determine SOLs and IROLs or operating nomograms in accordance with Reliability Standards IRO-005-1 and TOP-004-0.</p> <p>FERC said that because the reliability impact of EMS personnel are unclear, it directed NERC to consider whether such personnel need to be trained.</p>	Order No. 693 at P. 1372	<p><u>Directive is Ambiguous</u></p> <p>A number of commenters, through verbal conversations and the chat feature during PER webinars, stated that “operations planning” and “operations support” are too broad.</p>
<p><u>Scope of Training</u></p> <p>Entergy commented that if training is required, it should focus on the functions operations planning and operations support staff must perform, not on the functions that others perform.</p>	Order No. 693 at P. 1370	FERC clarified that training for support personnel should be tailored to the functions they perform and need not be trained to the same extent as transmission operators.		<u>Scope of Training</u>

EXTENDING APPLICABILITY TO SUPPORT PERSONNEL				
Industry Comment	Order Cite	FERC Response	Order Cite	Phase 2 Industry Comments
<p><u>No Reliability Benefit</u></p> <p>In response to the Order No. 742 NOPR, a number of commenters challenged the need for the directive. For example, Associated Electric urged the Commission to direct NERC to adopt a definition of “operations planning” and “operations support staff” that more narrowly identifies those personnel who will be subject to the training standard. Associated Electric stated that the directive in Order No. 693 is broad and will encompass operations planning and operation support staff who engage in tasks that do not directly affect the reliable operation of the Bulk Electric System.</p> <p>GSOC and GTC do not support expanding the applicability of the PER-005-1 training requirements to any other personnel and argue that time spent expanding training requirements to other personnel will take away from their job of supporting their operating personnel—a use of time and resources that could actually decrease reliability.</p>	Order No. 742 at P. 80	FERC rejected these arguments as beyond the scope of Order No. 742 and as collateral attacks on the ruling in Order No. 693 and refused to address the arguments again.	Order No. 742 at PP. 79, 81	<p><u>No Reliability Benefit</u></p> <p>A number of commenters, through verbal conversations and the chat feature during PER webinars, stated that tasks performed by support personnel do not directly affect the BES. Support personnel may guide, but do not operate.</p>

## Appendix B: Entity Participants

The below nonexhaustive list represents entities that had personnel who participated in the PER informal development effort in some manner, which may include one of the following: direct participation on the ad hoc group, inclusion on the wider distribution (the “plus”) list, attendance at workshops or other technical discussions, participation in a webinar or teleconference, or by providing feedback to the group through a variety of methods (e.g., email, phone calls, etc.). Additionally, announcements were distributed to wider NERC distribution lists to provide the opportunity for entities that were not actively participating to join the effort.

**Table 2: Entity Participation in PER Informal Development**

ACES Power	CPS Energy	IESO	NV Energy	Southern Co.
AECI	CSU	IMPA	OGE	STEC
AEP	CWLP	Integrity Group	OMU	Sunflower
AES	DC PUD	IREA	ORU	Sycamore
ALCOA	Detroit Renewable	ISO-NE	OUC	TID
Alliant Energy	Direct Energy	ITC	OXY	Tri-State G&T
Ameren	Dominion	KCPL	PacifiCorp	TVA
AMP Partners	DTE Energy	KUA	PEPCO	
APS	Duke Energy	LCEC	PGE	
ATC	Dynegy	LCRA	PGN	<b>Regional Entities</b>
Austin Energy	Energy GRP	LES	PJM	FRCC
Blackhills Corp	Entergy	LGE-KU	PNM	MRO
BPA	EP Electric	Luminant	PNM Resources	NPCC
Brazos Electric	ERCOT	MGE	PPL	RFC
Brownsville PUD	Essential Power LLC	MidAmerican	Seattle Power & Light	SERC
CAISO	Exelon Corp	Minnkota Power	Sempra Utilities	SPP
CB Power	FMTN	MISO Energy	Sharyland	TRE
Center Point Energy	FPL	NaturEner	SMEPA	WECC
Chelan PUD	GASOC	NIPSCO	SMMPA	
City of Tacoma	GC Pud	Northwestern	SMUD	
City Utilities	Hydro Manitoba	NRECA	Snohomish PUD	
Cleco Corporation	Hydro-Quebec	NU	South Westgen	

**Table 3: Presentations and Events**

NERC Operating Committee	FRCC Compliance Workshop
NERC EAS	WECC Operations Training Subcommittee
NERC Standards and Compliance Workshop	WECC Standing Committees
NERC News	TRE Standards Discussion Forum