
Project QC-2015-01

Standard EOP-010-1 – Geomagnetic Disturbance Operations

1. ASSESSMENT OF RELEVANCE

The EOP-010-1 standard aims to mitigate the effects of geomagnetic disturbances (GMD) events by implementing operating plans, process and procedures.

Consequences of GMD adversely impact the reliable operation of interconnected transmission systems. These disturbances could result in transformer damages, loss of Reactive Power sources, increase Reactive Power demand and misoperations. All these effects may result in voltage collapse and blackout. This standard is essential in mitigating these impacts within the area of reliability.

2. PREREQUISITE FOR ADOPTION

None

3. MODIFICATIONS TO OTHER STANDARDS OR TO GLOSSARY DEFINITIONS**3.1. Standards or requirements to be retired upon enforcement:**

None

3.2. New definitions to be added to the glossary:

None

3.3. Definitions to be retired from the glossary:

None

4. APPLICABILITY

Requirement	Applicable Functions	
	Reliability Coordinator	Transmission Operator
R1	X	
R2	X	
R3		X

This standard applies only to Contrôle des mouvements d'énergie, a direction of Hydro-Québec TransÉnergie.

5. PROVISIONS SPECIFIC TO QUÉBEC

None

6. PROPOSED EFFECTIVE DATES

The enforcement date in the United States was set to April 1st, 2015, excluding Requirement R2 that will not become effective until the first day following retirement of reliability standard IRO-005-3.1a because Requirement R3 of IRO-005-03.1a is equivalent. In the United States, IRO-005-3.1a was approved September 13, 2012 and will be replaced by IRO-005-4.

In Québec the Reliability Coordinator submitted IRO-005-3.1a under file R-3906-2014 but the decision is still pending.

Hydro-Québec applies this standard on a voluntary basis since its enforcement. Consequently, to catch up with the versions in force in the United States and in neighbouring provinces, and because the standard applies only to Contrôle des mouvements d'énergie, the Reliability Coordinator proposes to fast-track the coming into force of the standard in Québec.

Requirement	Enforcement date in the United States	Proposed enforcement date in Québec	Justification
R1, R3	April 1 st 2014	The first day of the first calendar quarter one month after the adoption of the standard by the Régie de l'énergie.	Standardization of practices with other jurisdictions.
R2	The first day following retirement of IRO-005-3.1a	The first day following retirement of IRO-005-3.1a. ¹	Standardization of practices with other jurisdictions.

7. PRELIMINARY ASSESSMENT OF THE IMPACT

	Low	Moderate	Important
Implementation of the standard		X	
Maintenance of the standard		X	
Compliance Monitoring		X	

Legend:

Low: Normal industry practice or standard involving minor adjustments to processes or practices in place.

Moderate: Changes that require an allocation of certain material, human or financial resources to implement, maintain and monitor compliance of the proposed standard.

Important: Changes that require significant provision and allocation of material, human or financial resources to implement, maintain and monitor compliance of the proposed standard.

8. FINAL IMPACT ASSESSMENT

This section is to be completed upon reception of the impact assessment forms and at the end of the consultation process prior to the filing of the standards with the Régie.

¹ The standard IRO-005-3.1a will be proposed for retirement with the filing of standard IRO-005-4 which is pending approval by FERC.

A. Introduction

1. **Title:** Geomagnetic Disturbance Operations
2. **Number:** EOP-010-1
3. **Purpose:** To mitigate the effects of geomagnetic disturbance (GMD) events by implementing Operating Plans, Processes, and Procedures.
4. **Applicability:**
 - 4.1. **Functional Entities:**
 - 4.1.1 Reliability Coordinator
 - 4.1.2 Transmission Operator with a Transmission Operator Area that includes a power transformer with a high side wye-grounded winding with terminal voltage greater than 200 kV
5. **Background:**

Geomagnetic disturbance (GMD) events have the potential to adversely impact the reliable operation of interconnected transmission systems. During a GMD event, geomagnetically-induced currents (GIC) may cause transformer hot-spot heating or damage, loss of Reactive Power sources, increased Reactive Power demand, and Protection System Misoperation, the combination of which may result in voltage collapse and blackout.
6. **Effective Date:**

The first day of the first calendar quarter that is six months after the date that this standard is approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard shall become effective on the first day of the first calendar quarter that is six months after the date this standard is adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

B. Requirements and Measures

- R1. Each Reliability Coordinator shall develop, maintain, and implement a GMD Operating Plan that coordinates GMD Operating Procedures or Operating Processes within its Reliability Coordinator Area. At a minimum, the GMD Operating Plan shall include:
[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning, Operations Planning, Same-day Operations, Real-time Operations]
 - 1.1 A description of activities designed to mitigate the effects of GMD events on the reliable operation of the interconnected transmission system within the Reliability Coordinator Area.
 - 1.2 A process for the Reliability Coordinator to review the GMD Operating Procedures or Operating Processes of Transmission Operators within its Reliability Coordinator Area.

- M1.** Each Reliability Coordinator shall have a current GMD Operating Plan meeting all the provisions of Requirement R1; evidence such as a review or revision history to indicate that the GMD Operating Plan has been maintained; and evidence to show that the plan was implemented as called for in its GMD Operating Plan, such as dated operator logs, voice recordings, or voice transcripts.
- R2.** Each Reliability Coordinator shall disseminate forecasted and current space weather information to functional entities identified as recipients in the Reliability Coordinator's GMD Operating Plan. *[Violation Risk Factor: Medium] [Time Horizon: Same-day Operations, Real-time Operations]*
- M2.** Each Reliability Coordinator shall have evidence such as dated operator logs, voice recordings, transcripts, or electronic communications to indicate that forecasted and current space weather information was disseminated as stated in its GMD Operating Plan.
- R3.** Each Transmission Operator shall develop, maintain, and implement a GMD Operating Procedure or Operating Process to mitigate the effects of GMD events on the reliable operation of its respective system. At a minimum, the Operating Procedure or Operating Process shall include: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning, Operations Planning, Same-day Operations, Real-Time Operations]*
 - 3.1.** Steps or tasks to receive space weather information.
 - 3.2.** System Operator actions to be initiated based on predetermined conditions.
 - 3.3.** The conditions for terminating the Operating Procedure or Operating Process.
- M3.** Each Transmission Operator shall have a GMD Operating Procedure or Operating Process meeting all the provisions of Requirement R3; evidence such as a review or revision history to indicate that the GMD Operating Procedure or Operating Process has been maintained; and evidence to show that the Operating Procedure or Operating Process was implemented as called for in its GMD Operating Procedure or Operating Process, such as dated operator logs, voice recordings, or voice transcripts.

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

As defined in the NERC Rules of Procedure, “Compliance Enforcement Authority” (CEA) means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

1.2. Evidence Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since

the last audit, the CEA may ask an entity to provide other evidence to show that it was compliant for the full time period since the last audit.

The Reliability Coordinator and Transmission Operator shall keep data or evidence to show compliance as identified below unless directed by its CEA to retain specific evidence for a longer period of time as part of an investigation:

The responsible entities shall retain documentation as evidence for three years.

If a responsible entity is found non-compliant, it shall keep information related to the non-compliance until mitigation is complete and approved or for the time specified above, whichever is longer.

The CEA shall keep the last audit records and all requested and submitted subsequent audit records.

1.3. Compliance Monitoring and Assessment Processes:

Compliance Audit

Self-Certification

Spot Check

Compliance Investigation

Self-Reporting

Complaint

1.4. Additional Compliance Information

None

Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Long-term Planning, Operations Planning, Same-day Operations, Real-time Operations	Medium	The Reliability Coordinator had a GMD Operating Plan, but failed to maintain it.	N/A	The Reliability Coordinator's GMD Operating Plan failed to include one of the required elements as listed in Requirement R1, parts 1.1 or 1.2.	The Reliability Coordinator did not have a GMD Operating Plan OR The Reliability Coordinator failed to implement a GMD Operating Plan within its Reliability Coordinator Area.
R2	Same-day Operations, Real-time Operations	Medium	N/A	N/A	N/A	The Reliability Coordinator failed to disseminate forecasted and current space weather information to all functional entities identified as recipients in the Reliability Coordinator's GMD Operating Plan.
R3	Long-term Planning, Operations Planning,	Medium	The Transmission Operator had a GMD Operating Procedure or Operating Process,	The Transmission Operator's GMD Operating Procedure or Operating Process	The Transmission Operator's GMD Operating Procedure or Operating Process	The Transmission Operator did not have a GMD Operating Procedure or Operating

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	Same-day Operations, Real-time Operations		but failed to maintain it.	failed to include one of the required elements as listed in Requirement R3, parts 3.1 through 3.3.	failed to include two or more of the required elements as listed in Requirement R3, parts 3.1 through 3.3.	Process OR The Transmission Operator failed to implement its GMD Operating Procedure or Operating Process.
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D. Regional Variances

None.

E. Interpretations

None.

F. Guideline and Technical Basis

During development of this standard, text boxes were embedded within the standard to explain the rationale for various parts of the standard. Upon BOT approval, the text from the rationale text boxes was moved to this section.

Rationale for R1:

An Operating Plan is implemented by carrying out its stated actions.

Coordination is intended to ensure that Operating Procedures are not in conflict with one another. An Operating Plan is maintained when it is kept relevant by taking into consideration system configuration, conditions, or operating experience, as needed to accomplish its purpose.

Elements of Requirement R1 take place in various time horizons. Development of the GMD Operating Plan occurs in the Long-Term Planning Time Horizon. Maintenance of the GMD Operating Plan occurs in the Operations Planning Time Horizon. Implementation of the GMD Operating Plan occurs in the Operations Planning, Same-Day and Real-Time Time Horizons.

Rationale for R2:

Requirement R2 replaces IRO-005-3.1a, Requirement R3. IRO-005-4 has been adopted by the NERC Board and filed with FERC, and will retire IRO-005-3.1a Requirement R3. If EOP-010-1 becomes effective prior to the retirement of IRO-005-3.1a, Requirement R2 shall become effective on the first day following retirement of IRO-005-3.1a.

Space weather forecast information can be used for situational awareness and safe posturing of the system. Current space weather information can be used for monitoring progress of a GMD event.

The Reliability Coordinator is responsible for disseminating space weather information to ensure coordination and consistent awareness in its Reliability Coordinator Area.

Rationale for R3:

In developing an Operating Procedure or Operating Process, an entity may consider entity-specific factors such as geography, geology, and system topology.

An Operating Procedure or Operating Process is maintained when it is kept relevant by taking into consideration system configuration, conditions, or operating experience, as needed to accomplish its purpose.

Version History

Version	Date	Action	Change Tracking
1	11/07/2013	Adopted by the NERC Board of Trustees	
1	6/19/2014	FERC Order issued approving EOP-010-1	

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Appendix QC-EOP-010-1

Provisions specific to the standard EOP-010-1 applicable in Québec

This appendix establishes specific provisions for the application of the standard in Québec. Provisions of the standard and of its appendix must be read together for the purposes of understanding and interpretation. Where the standard and appendix differ, the appendix shall prevail.

A. Introduction

1. **Title:** **Geomagnetic Disturbance Operation**
2. **Number:** EOP-010-1
3. **Purpose:** No specific provision
4. **Applicability:**
No specific provisions
5. **Background:**
No specific provisions
6. **Effective Date:**
 - 6.1. Adoption of the standard by the Régie de l'énergie: Month xx 201x
 - 6.2. Adoption of the appendix by the Régie de l'énergie: Month xx 201x
 - 6.3. Effective date of the standard and its appendix in Québec: Month xx 201x

B. Requirements and Measures

No specific provision

C. Compliance

1. **Compliance Monitoring Process**
 - 1.1. **Compliance Enforcement Authority**

The Régie de l'énergie is responsible, in Québec, for compliance monitoring with respect to the reliability standard and its appendix that it adopts.
 - 1.2. **Evidence Retention**

No specific provision
 - 1.3. **Compliance Monitoring and Assessment Processes**

No specific provision
 - 1.4. **Additional Compliance Information**

No specific provisions

Table of Compliance Elements

No specific provision

D. Regional Differences

No specific provision

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Appendix QC-EOP-010-1

Provisions specific to the standard EOP-010-1 applicable in Québec

E. Interpretation

No specific provision

F. Guideline and Technical Basis

No specific provisions

Revision History

Revision	Adoption Date	Action	Change Tracking
0	Month-xx, 201x	New Appendix	New