PRC-005-2 BC Webinar
February 25, 2015

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Introduction and Definition

Phil O’Donnell

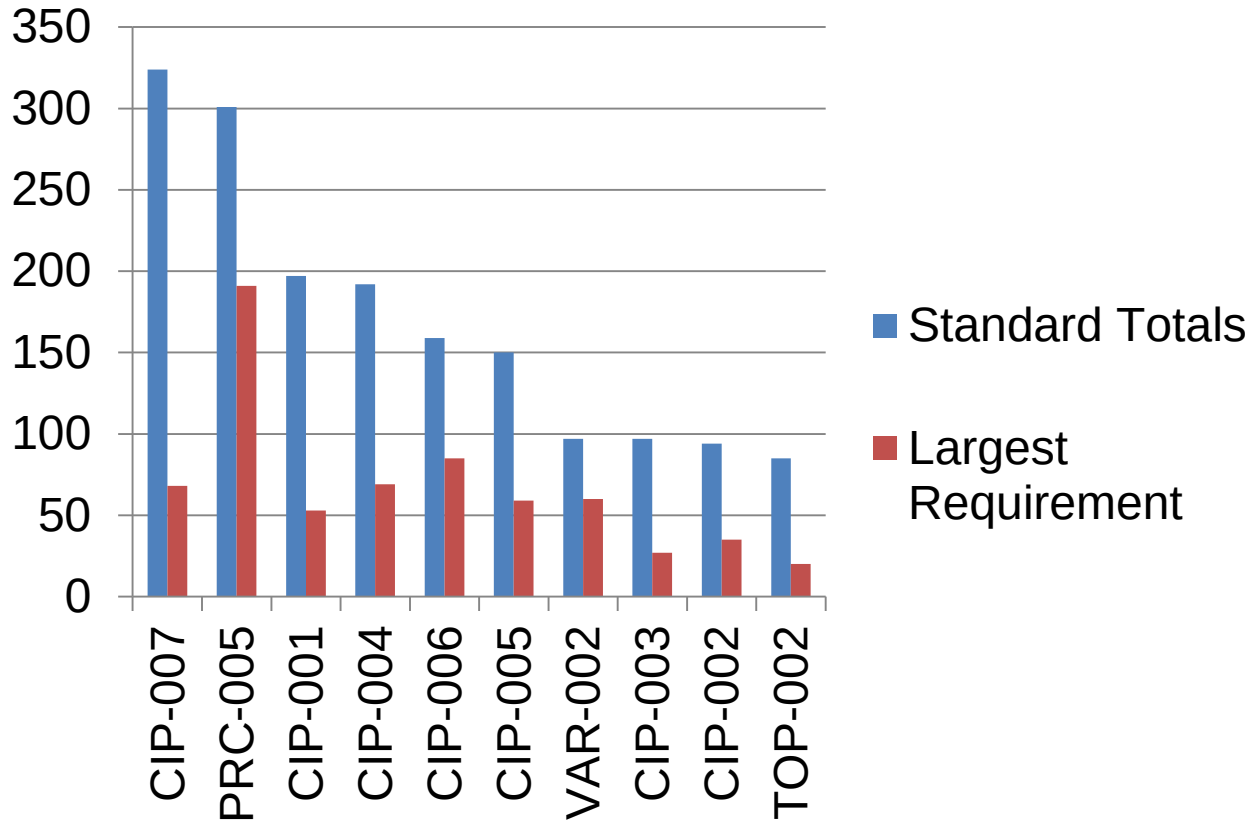
Disclaimer

- At the time of this presentation (February 25, 2015) PRC-005-2 is not approved or effective in British Columbia.
- This presentation does not represent an endorsement or recommendation from WECC Staff to the British Columbia Utilities Commission to adopt or incorporate this reliability standard.
- This presentation is provided as information only for the entities in British Columbia and is based on the experience of WECC Staff with the implementation of PRC-005-2 in the US.
- All dates associated with implementation and transition between standard versions are based on the U.S. implementation and may deviate significantly from implementation plans specified or approved by the BCUC.

Introduction and Definitions

- The Standard – Background
- Applicability
- Definitions and Terms
- Tables and Attachments
- Data and Evidence Retention
- Future Changes to PRC-005

Top 10 Violated Standards in WECC



Name and Change in Purpose

PRC-005-1

Transmission and Generation Protection System Maintenance and Testing

Purpose:

To ensure all transmission and generation Protection Systems affecting the reliability of the Bulk Electric System (BES) are maintained and tested.

PRC-005-2

Protection System Maintenance

Purpose:

To document and implement programs for the maintenance of all Protection Systems affecting the reliability of the Bulk Electric System (BES) so that these Protection Systems are kept in working order.

Combines Existing Standards

- PRC-005-1 Transmission and Generation Protection System Maintenance and Testing
- PRC-008-0 Implementation and Documentation of Underfrequency Load Shedding Equipment Maintenance Program
- PRC-011-0 Undervoltage Load Shedding System Maintenance and Testing
- PRC-017-0 Special Protection System Maintenance and Testing

PRC-005-1
PRC-008-0
PRC-011-0
PRC-017-0

PRC-005-2

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Applicable To…

- Transmission Owner
- Generator Owner
- Distribution Provider

Facilities (TO, DP)

- Protection Systems that are installed for the purpose of detecting Faults on BES Elements (lines, buses, transformers, etc.)
- Protection Systems used for underfrequency load-shedding systems installed per ERO underfrequency load-shedding requirements.
- Protection Systems used for undervoltage load-shedding systems installed to prevent system voltage collapse or voltage instability for BES reliability.
- Protection Systems installed as a Special Protection System (SPS) for BES reliability.

Protection Systems for Generator Facilities that are part of the BES

- Protection Systems that act to trip the generator either directly or via lockout or auxiliary tripping relays.
- Protection Systems for generator step-up transformers for generators that are part of the BES.
- Protection Systems for transformers connecting aggregated generation, where the aggregated generation is part of the BES (e.g., transformers connecting facilities such as wind-farms to the BES).
- Protection Systems for station service or excitation transformers connected to the generator bus of generators which are part of the BES, that act to trip the generator either directly or via lockout or tripping auxiliary relays.

Definitions:

Protection System –

- Protective relays which respond to electrical quantities,
- Communications systems necessary for correct operation of protective functions
- Voltage and current sensing devices providing inputs to protective relays,
- Station dc supply associated with protective functions (including batteries, battery chargers, and non-battery based dc supply), and
- Control circuitry associated with protective functions through the trip coil(s) of the circuit breakers or other interrupting devices.

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Definitions:

Component Type

Any one of the five specific elements of the Protection System Definition.

- Relays
- Sensing Devices
- Communications
- DC Control Circuitry
- Batteries & Supply

Definitions:

Component

A component is any individual discrete piece of equipment included in a Protection System, including but not limited to a protective relay or current sensing device. The designation of what constitutes a control circuit component is very dependent upon how an entity performs and tracks the testing of the control circuitry. Some entities test their control circuits on a breaker basis whereas others test their circuitry on a local zone of protection basis.

Definitions:

Component (cont.)

Thus, entities are allowed the latitude to designate their own definitions of control circuit components. Another example of where the entity has some discretion on determining what constitutes a single component is the voltage and current sensing devices, where the entity may choose either to designate a full three-phase set of such devices or a single device as a single component.

Definitions:

Protection System Maintenance Program (PSMP)

- An ongoing program by which Protection System components are kept in working order and proper operation of malfunctioning components is restored. A maintenance program for a specific component includes one or more of the following activities:
- Verify — Determine that the component is functioning correctly.
- Monitor — Observe the routine in-service operation of the component.
- Test — Apply signals to a component to observe functional performance or output behavior, or to diagnose problems.
- Inspect — Examine for signs of component failure, reduced performance or degradation.
- Calibrate — Adjust the operating threshold or measurement accuracy of a measuring element to meet the intended performance requirement.

Definitions:

Unresolved Maintenance Issue

A deficiency identified during a maintenance activity that causes the component to not meet the intended performance, cannot be corrected during the maintenance interval, and requires follow-up corrective action.

Tables & Attachments

Table or Att.	Description
Table 1-1	Protective Relay's
Table 1-2	Communications Systems
Table 1-3	Sensing Devices
Table 1-4a	DC Supply (VLA Batteries)
Table 1-4b	DC Supply (VRLA Batteries)
Table 1-4c	DC Supply (NiCad Batteries)
Table 1-4d	DC Supply (non- Battery
Table 1-4e	Exclusions for monitoring
Table 1-5	Control Circuitry
Table 2	Alarming Paths
Table 3	Distributed UFLS and UVLS Systems
Attachment A	Criteria for a Performance Based Protection System Maintenance Program.

Data and 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 is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full time period since the last audit.

Data and Evidence Retention Requirement 1

- Current dated PSMP, as well as any superseded versions since the preceding compliance audit, including the documentation that specifies the type of maintenance program applied to each Component Type.
- Documentation of legacy programs also required.

Data and Evidence Retention Requirements 2-5

- Documentation of the two most recent performances of each distinct maintenance activity for the Protection System Component, or
- All performances of each distinct maintenance activity for the Protection System Component since the previous scheduled audit date, whichever is longer.

PRC-005-2 Requirement R1

Joe Veltri

PRC-005-2 Requirement R1

Establishing a Protection System Maintenance Program (PSMP)

Requirement R1.1

Identify which maintenance method (time-based, performance-based per PRC-005 Attachment A, or a combination) is used to address each Protection System Component Type.

All batteries associated with the station dc supply Component Type of a Protection System shall be included in a time-based program as described in Table 1-4 and Table 3.

Requirement R1.2

Include the applicable monitored Component attributes applied to each Protection System Component Type consistent with the maintenance intervals specified in Tables 1-1 through 1-5,

Table 2, and Table 3 where monitoring is used to extend the maintenance intervals beyond those specified for unmonitored Protection System Components.

Requirement R1

Determine Maintenance Method

- Time Based
- Performance Based

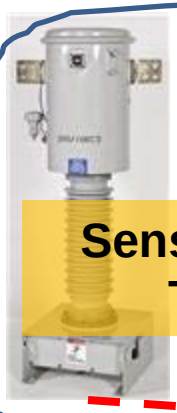
Time Based Maintenance

TBM – time-based maintenance – externally prescribed maximum maintenance or testing intervals are applied for components or groups of components.

Tables and Monitoring

- ✓ Select Appropriate Component Type Table
- ✓ Determine Degree of Monitoring
- ✓ Determine Maximum Interval
- ✓ Find Minimum Maintenance Activity

The Component Types



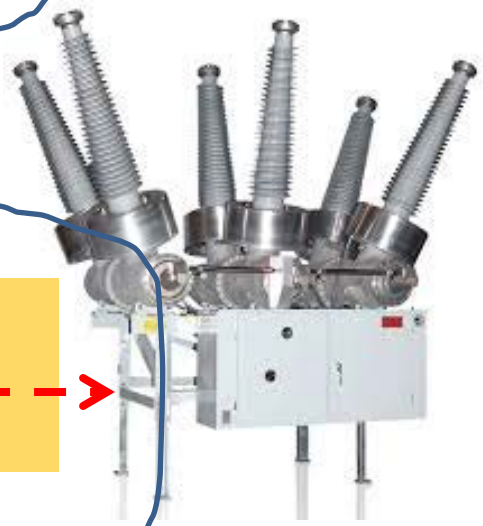
Sensing Devices
Table 1-3

Communication Systems
Table 1-2

Protective Relay
Table 1-1

DC Supply
Table 1-4a through 4f

Control
Circuitry
Table 1-5



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Monitoring

- ✓ Determine Level of Monitoring
- ✓ Unmonitored Protection System Components
- ✓ Monitored Protection System Components

Maintenance Activities

- The Minimum Maintenance Activities represent the minimum maintenance that **must** be performed and documented

- Under TBM, entities are responsible only for performing Minimum Maintenance Activities within the defined (or extended) interval.

Intervals

- Identify the Maximum Unmonitored Interval from the Tables
- Describe any monitoring applied that increases the interval
- Maximum Allowable Interval cannot be exceeded

Interval Definitions

- Four Calendar Months - Add four months from the last time the activity was performed.

- A battery bank inspected in month #1 is due again before the end of the month #5.

Interval Definitions

Calendar Year - January 1 through December 31 of any year. As an example, if an event occurred on June 17, 2009 and is on a “One Calendar Year Interval,” the next event would have to occur on or before December 31, 2010.

PRC-005-2

The Tables

Tables Associated with your Component

- Table 1-1 Protective Relays
- Table 1-2 Associated Communications
- Table 1-3 Instrument Transformers
- Table 1-4 Station DC Supply
- Table 1-5 Control Circuits

Tables Associated with your Component

- Table 2 Alarming & Paths
- Table 3 Distributed UFLS & UVLS

- A DISTRIBUTED UFLS or UVLS scheme contains individual relays which make independent load shed decisions based on applied settings and localized voltage and/or current inputs

Table 1-2 Component Type - Communications Systems Excluding distributed UFLS and distributed UVLS (see Table 3)		
Component Attributes	**Maximum Maintenance Interval**	**Maintenance Activities**
Any unmonitored communications system necessary for correct operation of protective functions, and not having all the monitoring attributes of a category below.	4 calendar months	Verify that the communications system is functional.
	6 calendar years	Verify that the communications system meets performance criteria pertinent to the communications technology applied (e.g. signal level, reflected power, or data error rate). Verify operation of communications system inputs and outputs that are essential to proper functioning of the Protection System.
Any communications system with continuous monitoring or periodic automated testing for the presence of the channel function, and alarming for loss of function (See Table 2).	12 calendar years	Verify that the communications system meets performance criteria pertinent to the communications technology applied (e.g. signal level, reflected power, or data error rate). Verify operation of communications system inputs and outputs that are essential to proper functioning of the Protection System.
Any communications system with all of the following: • Continuous monitoring or periodic automated testing for the performance of the channel using criteria pertinent to the communications technology applied (e.g. signal level, reflected power, or data error rate, and alarming for excessive performance degradation). (See Table 2) • Some or all binary or status inputs and control outputs are monitored by a process that continuously demonstrates ability to perform as designed, with alarming for failure (See Table 2).	12 calendar years	Verify only the unmonitored communications system inputs and outputs that are essential to proper functioning of the Protection System

Protective Relay

Table 1-1
Component Type - Protective Relay
Excluding distributed UFLS and distributed UVLS (see Table 3)

Component Attributes	Maximum Maintenance Interval[1]	Maintenance Activities
Any unmonitored protective relay not having all the monitoring attributes of a category below	6 calendar years	For all unmonitored relays: • Verify that settings are as specified For non-Microprocessor relays: • Test and, if necessary calibrate For Microprocessor relays: • Verify operation of the relay inputs and outputs that are essential to proper functioning of the Protection System • Verify acceptable measurement of power system input values

Protective Relay *(con't)*

Table 1-1
Component Type - Protective Relay
Excluding distributed UFLS and distributed UVLS (see Table 3)

Component Attributes	Maximum Maintenance Interval[1]	Maintenance Activities
Monitored microprocessor protective relay with the following: • Internal self-diagnosis and alarming (see Table 2) • Voltage and/or current waveform sampling three or more times per power cycle, and conversion of samples to numeric values for measurement calculations by microprocessor electronics. • Alarming for power supply failure (see Table 2)	12 calendar years	Verify: • Settings are as specified. • Operation of the relay inputs and outputs that are essential to proper functioning of the Protection System. • Acceptable measurement of power system input values

Protective Relay *(con't)*

Table 1-1 Component Type - Protective Relay Excluding distributed UFLS and distributed UVLS (see Table 3)		
Component Attributes	**Maximum Maintenance Interval[1]**	**Maintenance Activities**
Monitored microprocessor protective relay with preceding row attributes and the following: • AC measurements are continuously verified by comparison to an independent ac measurement source, with alarming for excessive error (see Table 2) • Some or all binary or status inputs and control outputs are monitored by a process that continuously demonstrates ability to perform as designed, with alarming for failure (See Table 2) • Alarming for change of settings (see Table 2).	12 calendar years	Verify only the unmonitored relay inputs and outputs that are essential to proper functioning of the Protection System.

DC Supply VLA

Table 1-4(a)
Component Type – Protection System dc Supply Using Vented Lead Acid (VLA) Batteries
Excluding distributed UFLS and distributed UVLS (see Table 3)

Protection System Station dc supply used only for non-BES interrupting devices for SPS, non-distributed UFLS Systems or non-distributed UVLS systems excluded (See Table 1-4(e))

Component Attributes	Maximum Maintenance Interval	Maintenance Activities
• Protection System Station dc supply using Vented Lead-Acid (VLA) batteries not having monitored attributes of Table 1-4(f).	4 Calendar Months	Verify: • Station dc supply voltage Inspect: • Electrolyte level • For unintentional grounds

DC Supply VLA

Table 1-4(a)
Component Type – Protection System dc Supply Using Vented Lead Acid (VLA) Batteries
Excluding distributed UFLS and distributed UVLS (see Table 3)

Protection System Station dc supply used only for non-BES interrupting devices for SPS, non-distributed UFLS Systems or non-distributed UVLS systems excluded (See Table 1-4(e))

Component Attributes	Maximum Maintenance Interval	Maintenance Activities
• Protection System Station dc supply using Vented Lead-Acid (VLA) batteries not having monitored attributes of Table 1-4(f).	18 Calendar Months	Verify: • Float voltage of battery charger • Battery continuity • Battery terminal connection resistance • Battery intercell or unit-to-unit connection resistance Inspect: • Cell condition of all individual battery cells where cells are visible or measure battery cell/unit internal ohmic values where the cells are not visible. • Physical condition of battery rack.

DC Supply VLA

Table 1-4(a)
Component Type – Protection System dc Supply Using Vented Lead Acid (VLA) Batteries
Excluding distributed UFLS and distributed UVLS (see Table 3)

Protection System Station dc supply used only for non-BES interrupting devices for SPS, non-distributed UFLS Systems or non-distributed UVLS systems excluded (See Table 1-4(e))

Component Attributes	Maximum Maintenance Interval	Maintenance Activities
• Protection System Station dc supply using Vented Lead-Acid (VLA) batteries not having monitored attributes of Table 1-4(f).	18 Calendar Months -or- 6 Calendar Years	Verify that the station battery can perform as manufactured by evaluating cell/unit measurements indicative of battery performance (e.g. internal ohmic values or float current) against the station battery baseline. -or- Verify that the station battery can perform as manufactured by conducting a performance of modified performance capacity test of the entire battery bank.

DC Supply Tables

- Table 1-4(b) Valve Regulated Lead Acid
- Table 1-4(c) Nickel Cadmium (NICAD)
- Table 1-4(d) Non Battery Based Energy Storage

Each Table defines Maximum Maintenance Interval and Maintenance Activities

Communication Systems Table 1-2

- Any unmonitored communication system necessary for correct operation of protective functions
- Continuous monitoring or periodic automated testing and alarm for loss of function
- Continuous monitoring or automated testing (signal level. Reflected power, data error rates)
- Binary inputs and control outputs monitored by process continuously demonstrating ability to perform as designed with alarming for failure.

Control Circuitry Associated with Protective Functions

- Trip Coils
- Electromechanical lockout devices
- Unmonitored control circuitry associated with SPS
- Unmonitored control circuitry inclusive of all auxiliary relays
- Monitored & alarmed control circuitry associated with protective functions and /or SPS

Instrument Transformers

Table 1-3
Component Type – Voltage and Current Sensing Devices providing inputs to Protective Relays Excluding distributed UFLS and distributed UVLS

Component Attributes	Maximum Maintenance Interval[1]	Maintenance Activities
Any voltage and current sensing devices not having monitoring attributes of the category below	12 calendar years	Verify that current & voltage signal values are provided to the protective relays

Instrument Transformers

Table 1-3
Component Type – Voltage and Current Sensing Devices providing inputs to Protective Relays Excluding distributed UFLS and distributed UVLS

Component Attributes	Maximum Maintenance Interval[1]	Maintenance Activities
Voltage and current sensing devices connected to microprocessor relays with AC measurements are continuously verified by comparison of sensing input value as measured by the MP relay to independent measuring source with alarming for unacceptable error failure (See table 2)	No Periodic Maintenance specified	None

Exclusions for DC Supply Monitoring Table 1-4 (f)

Table 1-4(f)
Exclusions for Protection System Station dc Supply Monitoring Devices and Systems

Component Attributes	Maximum Maintenance Interval	Maintenance Activities
Any station dc supply with high and low voltage monitoring and alarming of the battery charger voltage to detect charger overvoltage and charger failure (See Table 2).	No periodic maintenance	No periodic verification of station dc supply voltage is required.
Any battery based station dc supply with electrolyte level monitoring and alarming in every cell (See Table 2).		No periodic inspection of the electrolyte level for each cell is required.
Any station dc supply with unintentional dc ground monitoring and alarming (See Table 2).		No periodic inspection of unintentional dc grounds is required.
Any station dc supply with charger float voltage monitoring and alarming to ensure correct float voltage is being applied on the station dc supply (See Table 2).		No periodic verification of float voltage of battery charger is required.
Any battery based station dc supply with monitoring and [illegible]		[illegible] periodic verification of [illegible] battery continuity is require[illegible]

Alarming Paths & Monitoring

Table 2 – Alarming Paths and Monitoring In Tables 1-1 through 1-5 and Table 3, alarm attributes used to justify extended maximum maintenance intervals and/or reduced maintenance activities are subject to the following maintenance requirements		
Component Attributes	**Maximum Maintenance Interval**	**Maintenance Activities**
Any alarm path through which alarms in Tables 1-1 through 1-5 and Table 3 are conveyed from the alarm origin to the location where corrective action can be initiated, and not having all the attributes of the "Alarm Path with monitoring" category below. Alarms are reported within 24 hours of detection to a location where corrective action can be initiated.	12 Calendar Years	Verify that the alarm path conveys alarm signals to a location where corrective action can be initiated.
Alarm Path with monitoring: The location where corrective action is taken receives an alarm within 24 hours for failure of any portion of the alarming path from the alarm origin to the location where corrective action can be initiated.	No periodic maintenance specified	None.

UFLS / UVLS Table 3

- Unmonitored Protective Relays
- Monitored Microprocessor Relays
- Instrument Transformers
- Protection System DC Supply
- Control Circuits
  - Relay to Lockout
  - Lockout to tripping device
    - Excludes Trip Coils of Non- BES interrupting devices

Approach and Evidence

Phil O’Donnell

PRC-005-2 – Requirement 3

R3. Each Transmission Owner, Generator Owner, and Distribution Provider that utilizes timebased maintenance program(s) shall maintain its Protection System Components that are included within the time-based maintenance program in accordance with the minimum maintenance activities and maximum maintenance intervals prescribed within Tables 1-1 through 1-5, Table 2, and Table 3.

PRC-005-2 – Requirement 3

Very similar to the current PRC Standards except…

- Required Maintenance Activities are specified
- Maximum Interval is Specified

Table 1-2 Component Type - Communications Systems Excluding distributed UFLS and distributed UVLS (see Table 3)		
Component Attributes	**Maximum Maintenance Interval**	**Maintenance Activities**
Any unmonitored communications system necessary for correct operation of protective functions, and not having all the monitoring attributes of a category below.	4 calendar months	Verify that the communications system is functional.
	6 calendar years	Verify that the communications system meets performance criteria pertinent to the communications technology applied (e.g. signal level, reflected power, or data error rate). Verify operation of communications system inputs and outputs that are essential to proper functioning of the Protection System.
Any communications system with continuous monitoring or periodic automated testing for the presence of the channel function, and alarming for loss of function (See Table 2).	12 calendar years	Verify that the communications system meets performance criteria pertinent to the communications technology applied (e.g. signal level, reflected power, or data error rate). Verify operation of communications system inputs and outputs that are essential to proper functioning of the Protection System.
Any communications system with all of the following: • Continuous monitoring or periodic automated testing for the performance of the channel using criteria pertinent to the communications technology applied (e.g. signal level, reflected power, or data error rate, and alarming for excessive performance degradation). (See Table 2) • Some or all binary or status inputs and control outputs are monitored by a process that continuously demonstrates ability to perform as designed, with alarming for failure (See Table 2).	12 calendar years	Verify only the unmonitored communications system inputs and outputs that are essential to proper functioning of the Protection System

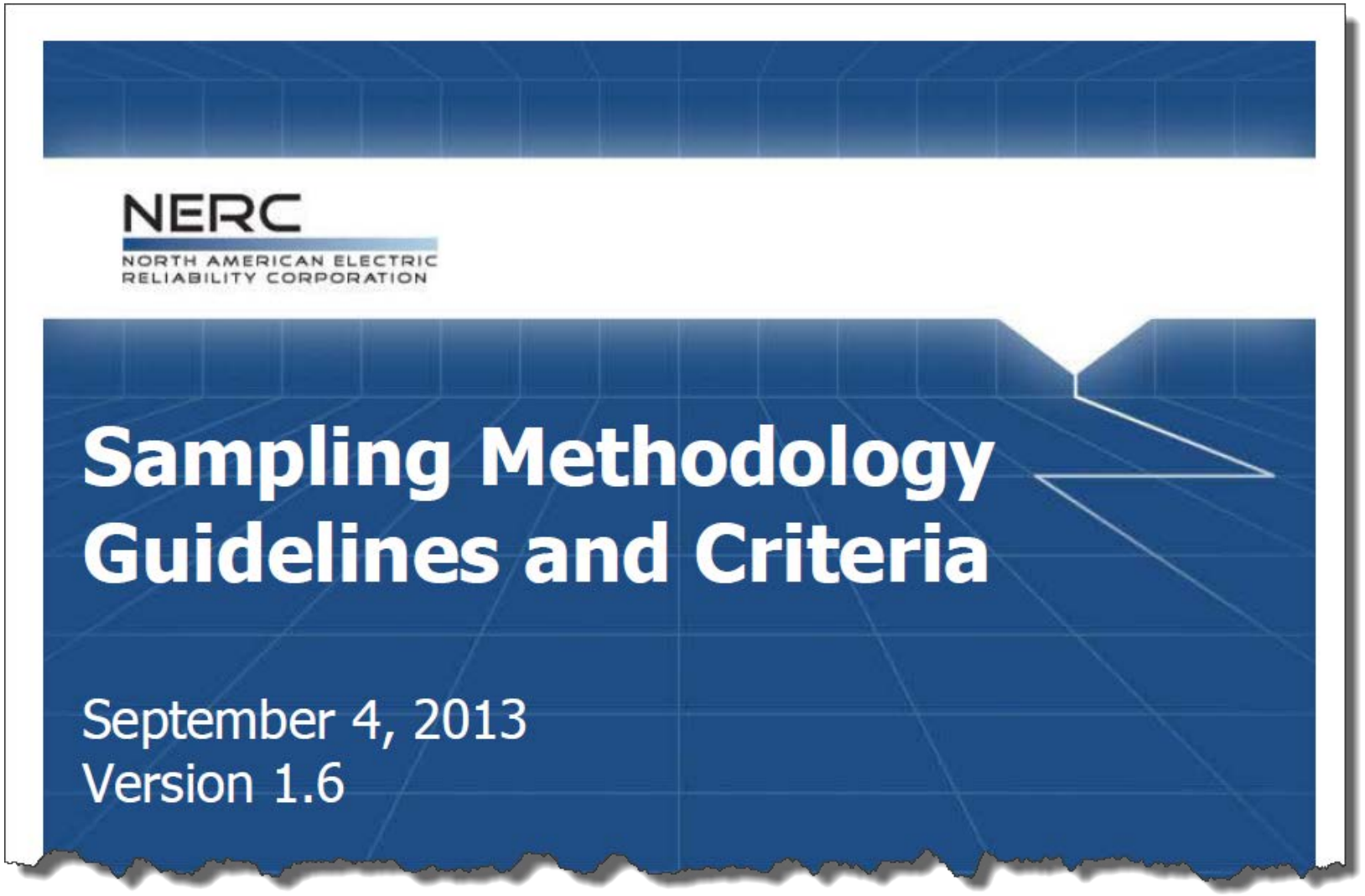
Evidence for Assessment

Per Draft RSAW

A comprehensive list of all of the entity's Protection System Components (and Alarm Paths) being maintained under PRC-005-2 time-based maintenance programs providing:

- Will be requested prior to audit (when RSAW and initial documentation is due)
- This will provide the basis for a sampling of records for additional review
- This will be communicated by completing the Attachment G Supplement spreadsheet.

NERC Sampling Guidelines



NERC Sampling Guidelines

Appendix A – Sampling Methodology Criteria Table

Sampling Methodology Criteria Table	
Population Description	**Sample Selection***
Documentation Review-Primary Population (Examples: Substations, Generating Stations)	**Using RAT-STATS [9]**
1-8	Entire population
9 +	8 Samples
Documentation Review-Dependent Population of Elements (Examples: Relays, CCAs, Others)	**Using Haphazard or RAT-STATS**
1-9	All Elements
10-19	9 Samples
20-40	16Samples
41-100	23 Samples
101-1000	29 Samples
1001 +	33 Samples
Docu[illegible]	[illegible]

Evidence for Assessment

- Samples will be requested which satisfy NERC sampling guidelines.
- Detailed Documentation for each Component required if selected for sample.
- Documentation that the maintenance specified by the Tables was performed on the dates required.
  - The evidence may include but is not limited to dated maintenance records, dated maintenance summaries, dated check-off lists, dated inspection records, or dated work orders.

Documentation that that each component or Path being maintained under PRC-005-2 has the attributes specified by the PRC-005-2 Tables which justify the use of the maintenance interval and/or minimum maintenance activities being performed.

Legacy Programs

- More info in discussion on Implementation of PRC-005-2
- Single Attachment G Supplement
- Samples will include some from old programs
- Will be held to requirements of previous standards
- Will be looking for Progress on Transition.

Requirement 4

- Implementation of a Performance-based PSMP

- Are any entities present planning to utilize PBM?

Unresolved Maintenance Issues

Phil O’Donnell

PRC-005-2 Workshop R5
Unresolved Maintenance Issues

PRC-005-2, R5

- Each Transmission Owner, Generator Owner, and Distribution Provider shall demonstrate efforts to correct identified Unresolved Maintenance Issues.

PRC-005-2 R5

Definition – Unresolved Maintenance Issue

- A deficiency identified during a maintenance activity that causes the component to not meet the intended performance, cannot be corrected during the maintenance interval, and requires follow-up action.

PRC-005-2 R5

- Applies to all Protection System components.

- Requires demonstration of efforts to correct any identified Unresolved Maintenance Issues.

PRC-005-2

- Evidence of efforts to correct may include but is not limited to:
  - work orders
  - replacement Component orders
  - invoices
  - project schedules with completed milestones
  - return material authorizations (RMAs)
  - purchase orders.

The Implementation Plan and Transition

Roger Cummins

Attachment G Supplement

Providing Information

Attachment G Supplement

- **Entities must identify:**
  - Method (TBM, PBM)
  - Monitoring (any interval above the maximum unmonitored)
  - Program (version 1, version 2)
  - Application (UFLS, SPS…)
  - Segments with description
  - Countable events (and %)

Attachment G Supplement

- **The Standard does not differentiate Transmission and Generator protection systems.**
  - Applicability: *Protection Systems*
    - *installed for the purpose of…*
    - *used for…*
    - *that act to trip…*

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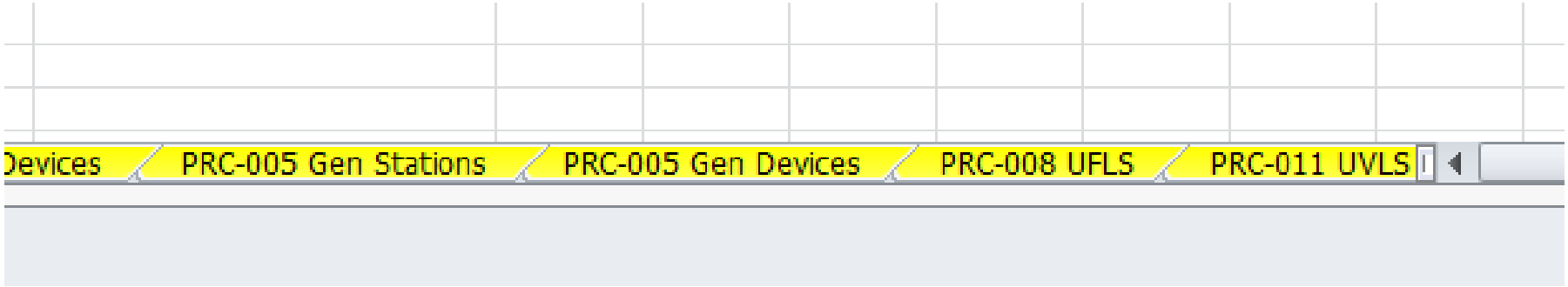
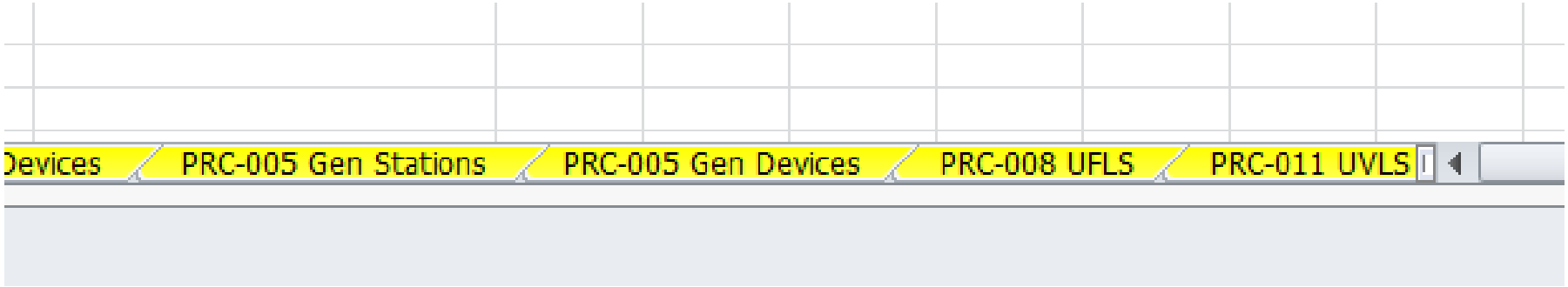
Attachment G Supplement

- Revised and expanded to request the additional data.
- Provided two additional data submittal options related to data organization.



Option 1: Legacy tabs

- **Option 1: *Legacy* tabs will be provided.**
  - Input data as before
  - Additional data required, columns added.



Option 1 – Legacy tabs

Gen/Substation Name	Device Name	Device Description	Date Last Tested	Prior Test Date	Interval	

Option 1 – Legacy tabs

- Additional data is required.

Interval	Maintenance Method (TBM,PBM)	Program Version (Last Test)	Program Version (Prior Test)	Monitoring (Y/N)	Segment Identifier

Complete applicable tabs for UFLS (PRC-008), SPS (PRC-017)

Option 1 – Legacy tabs

- Version under which the component was tested

or,

- Version with which the test is compliant

Interval (Table)	Maintenance Method (TBM,PBM)	Program Version (Last Test)	Program Version (Prior Test)	Monitoring (Y/N)	Segment Identifier
12 yrs	TBM	PRC-005-2	PRC-005-1	Yes	
8 yrs	TBM	PRC-005-1	PRC-005-1	Yes	
20 yrs	PBM	PRC-005-2	PRC-005-1	Yes	B

Interval or Table

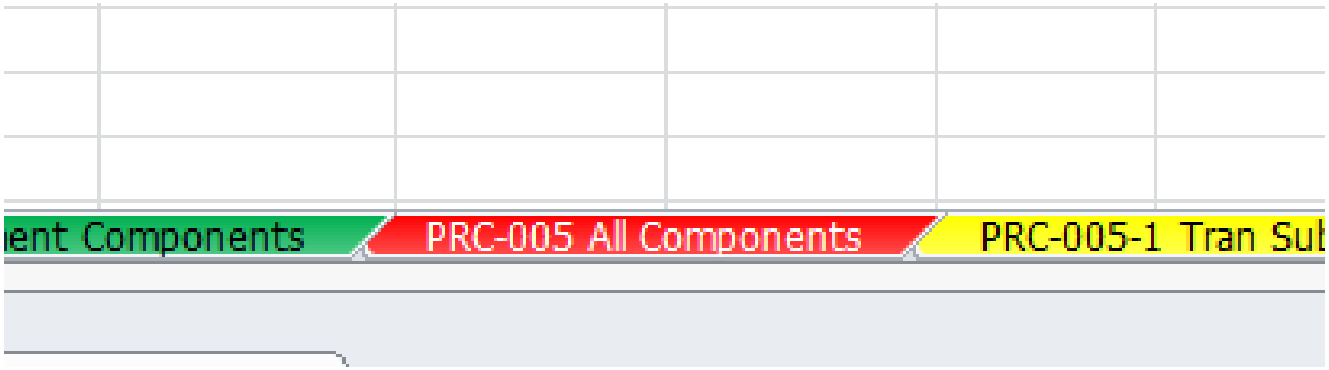
- Time-based
- Performance-based

Is monitoring applied?

PBM only

Option 2 – A single tab

- **Option 2: PRC-005 All Components**
  - o List <u>all</u> devices in this single tab



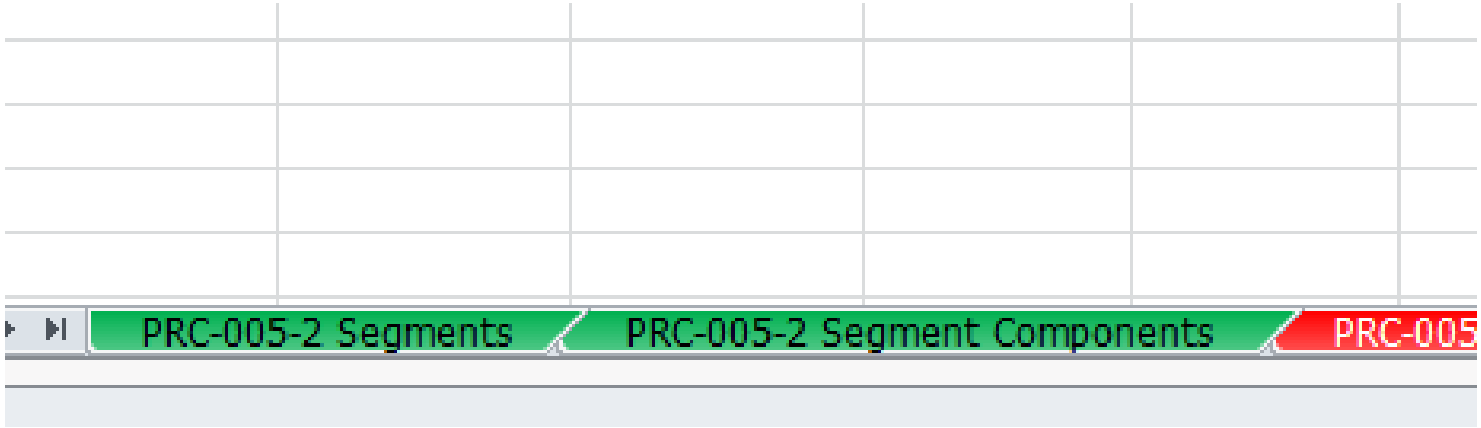
Option 2 – A single tab

- Option 1 information, *plus*:

	Protection Type (UFLS, SPS)	Table
	UFLS	Table 3
	SPS	
	UVLS	

Option 3: Segment tabs

- **Option 3: Segment tabs**
  - List Components by Segment.
    - TBM components use either Option 1 or 2.



PRC-005-2

Implementation

What To Do

And

When To Do It

Implementation Plan (US)

- Regulatory approval date
- Effective date of the Standard is calculated from the regulatory approval date
- The Implementation Plan defines the enforcement dates of the requirements and associated milestones.

Implementation Plan

- The IP is phased (maintenance):
  - the 100% compliance date in the US is 2027
  - the legacy standards are retired on that date

- Enforcement dates are calculated from the effective date of PRC-005-2.

- The first *enforcement* date is at 12 months.

Implementation Plan

- May continue to use current plan to become compliant with PRC-005-2.
  - Current intervals may be preserved.
  - Maintenance activities defined in the tables must be included.
  - Tests outside the interval specified in the tables are not compliant with PRC-005-2 for the purpose of retirement of the legacy standards.

Implementation Plan

Implementation Plan for Requirements R1, R2 and R5:

- Entities shall be 100% compliant on the first day of the first calendar quarter twelve (12) months following applicable regulatory approvals.

Implementation Plan

- R1/R2 – establish the PSMP (TBM, PBM, or both)

Implementation Plan

- R5 – Unresolved Maintenance Issues
  - Entities should be tracking issues as of the effective date if they may become a UMI.
  - Evidence of efforts to correct the UMI may be requested for those outstanding on or after the enforceable date. (12 months)
    - The entity must be able to demonstrate efforts on that date.

Implementation Plan

Implementation Plan for Requirements R3 and R4:

- Phased implementation, based on ***Maximum Allowable Interval.***

Implementation Plan

Maximum Interval <1 calendar year		
Compliance	**Months**	**US Compliance Date**
100%	18	October 1, 2015*

*Calculated from effective date in the US, April 1, 2014.

Implementation Plan

Maximum Interval ≥1 / <2 calendar years		
Compliance	**Months**	**Compliance Date**
100%	36	

Implementation Plan

Maximum Interval 3 calendar years		
Compliance	**Months***	**Compliance Date**
30%	24	
60%	36	
100%	48	

*For generating plants with scheduled outage intervals exceeding two years, at the conclusion of the first succeeding maintenance outage.

WECC

Implementation Plan

Maximum Interval 6 calendar years		
Compliance	**Months***	**Compliance Date**
30%	36	
60%	60	
100%	84	

*For generating plants with scheduled outage intervals exceeding three years, at the conclusion of the first succeeding maintenance outage.

WECC

Implementation Plan

Maximum Interval 12 calendar years		
Compliance	**Months**	**Compliance Date**
30%	60	
60%	108	
100%	156	

PRC-005-2

Transition

Things We Need To Know

Transition

- While in transition, be prepared to identify:
  - All applicable Protection System components.
  - The plan under which components were last maintained; PRC-005-2 or the Legacy plan.
    - Was the maintenance performed according to the maintenance activities in PRC-005-2? (Transition)
    - Was the maintenance performed within the maximum interval in PRC-005-2? (Retirement)

Transition

- The Legacy Standards:
  - Remain active throughout the phased implementation;
  - Applicable to an entity's Protection System component maintenance not yet transitioned to PRC-005-2.

Transition

- Adding maintenance activities:
  - For activities being added to an entity's program, evidence may be available to show only a single performance.

Transition

- The Legacy Standards
  - “retired” by the entity as Component Types become compliant with PRC-005-2.
    - Must be able to determine the Maximum Allowable Interval.

Transition

- Maintain Protection System components:
  - According to the ***maintenance program already in place*** for the legacy standards or ***the maintenance program for PRC-005-2…***
- …but not both.

Transition

- Choose the version of your PSMP that will be used to come into compliance with PRC-005-2.
  - o May apply to all Components
  - o May apply individually to specific Components or Component Types

Transition

- Once ***an entity has designated*** PRC-005-2 as its maintenance program for ***specific*** Protection System components, it ***cannot revert*** to the original program for those components.

Transition

- Maintain documentation to demonstrate compliance with the Legacy Standards until the entity meets the requirements of PRC-005-2 in accordance with the implementation plan.

Transition

- *"…meets the requirements of PRC-005-2…"*
  - Once an individual component has been maintained according to the Tables
  - Following a single successful audit of PRC-005-2, the audit team will not *normally* request records for prior maintenance during the previous audit period if that maintenance occurred under PRC-005-1.

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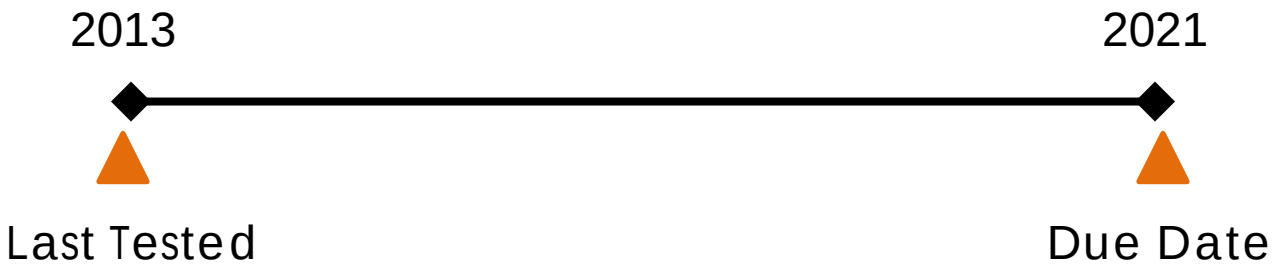
Transition

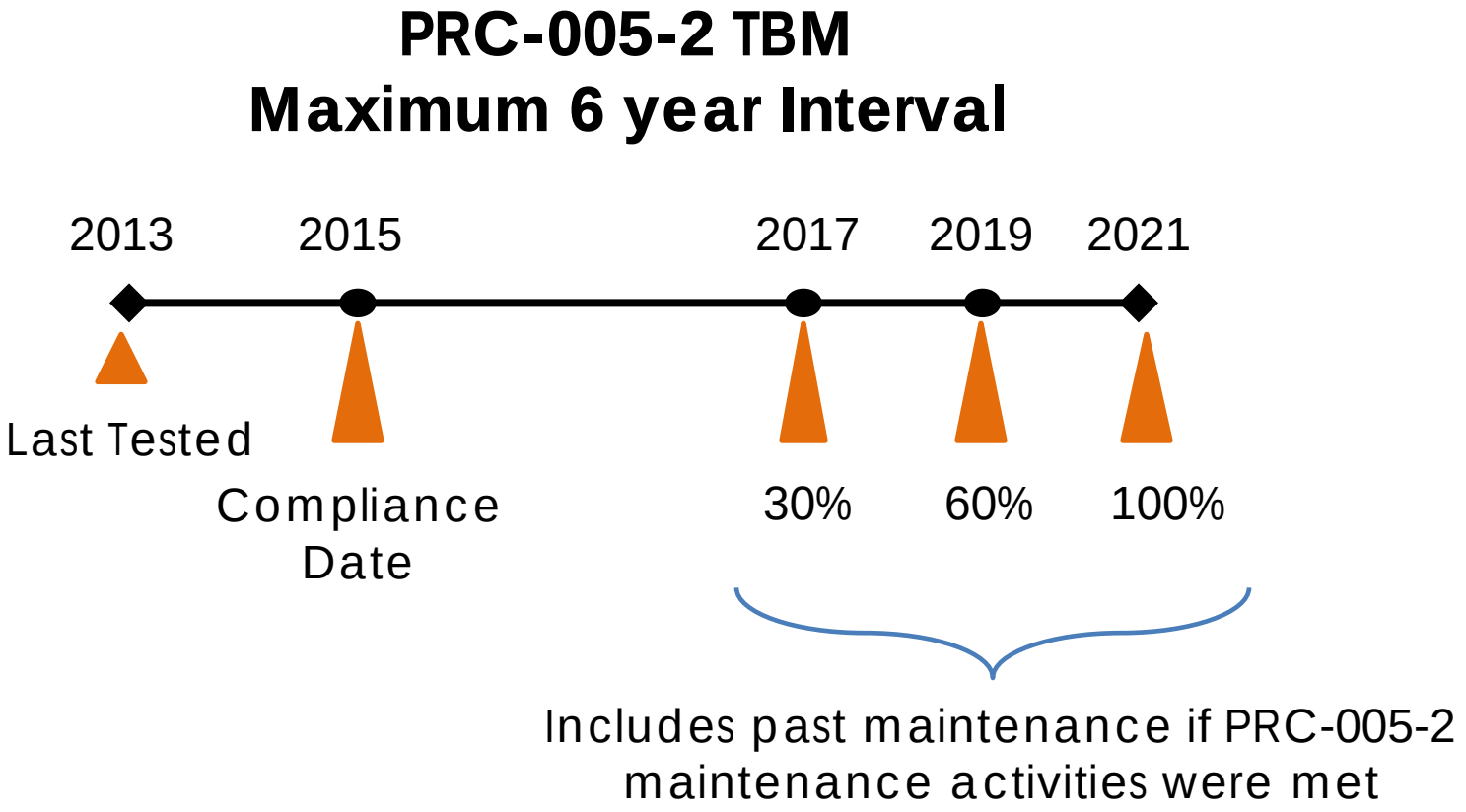
- Formally transitioning Component Type(s) to PRC-005-2.
  - Once a Last and Prior test demonstrate performance according to the tables, that specific ***Component*** is compliant with PRC-005-2. (ex. A single EM relay)
  - Once a ***Component Type*** is compliant, that Component Type may be transitioned to PRC-005-2. (ex. All EM relays)

Transition

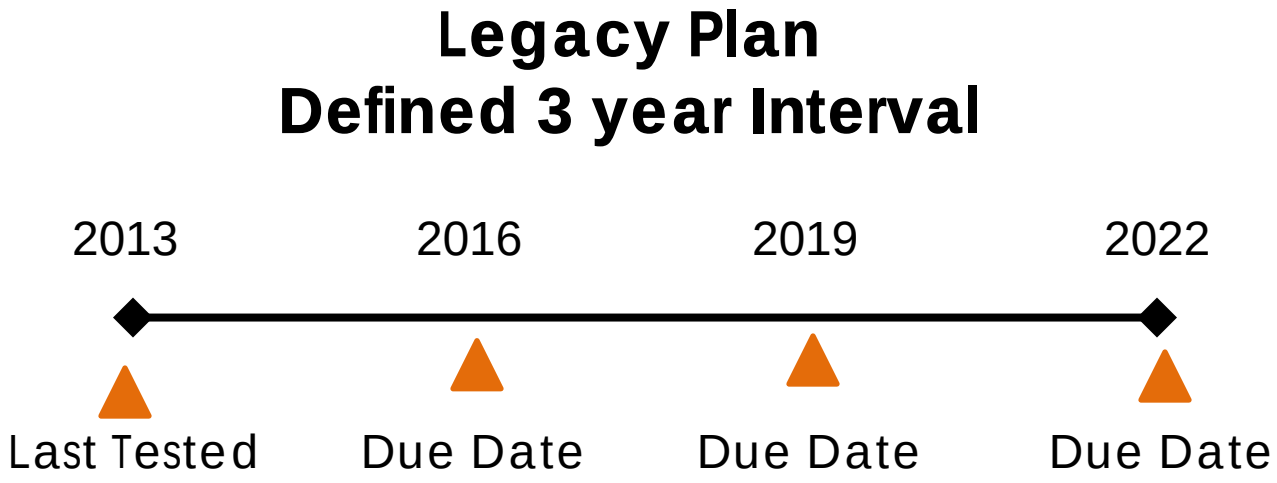
Legacy Plan
Defined 8 year Interval



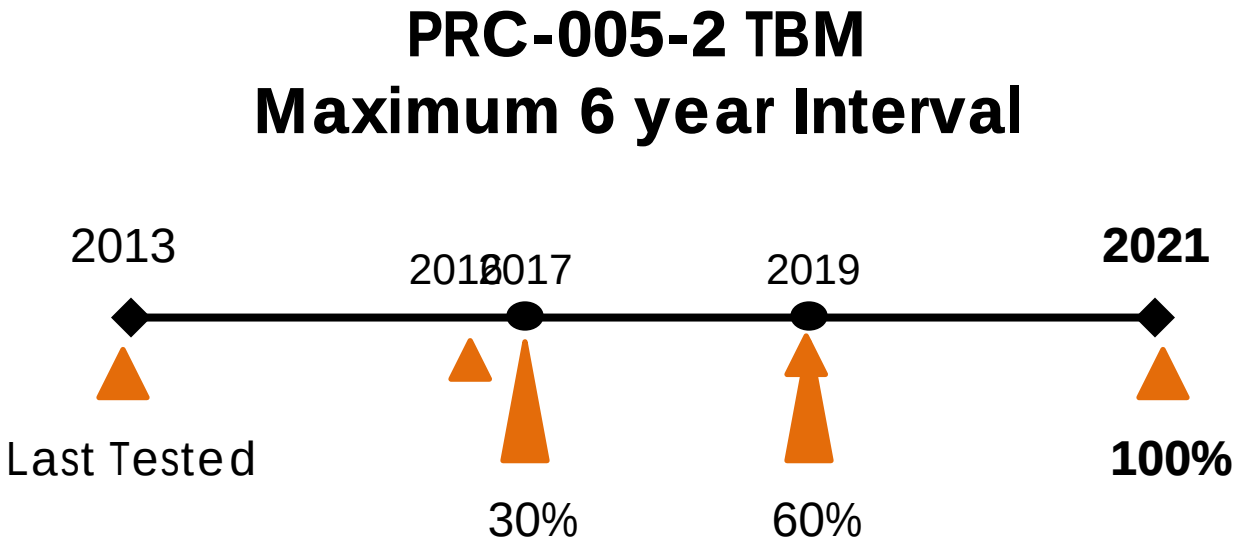
Transition


PRC-005-2 TBM
Maximum 6 year Interval
2013
2015
2017
2019
2021
Last Tested
Compliance Date
30%
60%
100%
Includes past maintenance if PRC-005-2 maintenance activities were met

Transition


Legacy Plan
Defined 3 year Interval
2013
2016
2019
2022
Last Tested
Due Date
Due Date
Due Date

Transition


PRC-005-2 TBM
Maximum 6 year Interval
2013
2018
2017
2019
2021
Last Tested
30%
60%
100%

Parting recommendation

- The Tables in PRC-005-2 may be adopted into your current PRC-005-1 plan and compliance can be maintained.
  - WECC recognizes the Tables are embedded in a Standard approved in the US; and, the Tables prescribe maximum intervals and minimum maintenance activities.

Parting recommendation

- **Adopt the Tables into your current plan in preparation for PRC-005-2.**
- **Perform maintenance activities according to the in the Tables.**
- **Implement the intervals when you are able.**

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