



# Protective Engineering Services (Relay Settings)

Providing Quality Design to Ensure System Reliability

Faced with increased regulation on protection design, utilities need a trusted partner that can deliver quality and reliability. A firm with protection engineering expertise in technology with evergrowing complexity is critical to mitigating risks to reliable power system operation.

Black & Veatch has developed a three-pronged approach to protection engineering services to meet critical client needs in transmission and distribution substations. We have a dedicated protection settings team, with professionals focused on calculations and protection settings design

tasks encountered in substations. We use customizable process maps that allow us to easily onboard settings professionals with client standards and guides with less work from the client. We also continually update our quality assurance checklists and designs to mitigate potential for protection Misoperations. Through our approach, clients can be confident that our protection designs are developed to industry/client standards and regulations to ensure that customers are insulated from unplanned loss of power.

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# Dedicated Resources

Black & Veatch's dedicated settings group is focused on mastering protection skills. These professionals are monitored in terms of their ability to set and furnish design verification of different protection applications. Professionals are assigned to design tasks based on their demonstrated capabilities, as the complexity of a protection scheme requires specific experience.

Black & Veatch recognizes that protection settings development is a specialized skill requiring professionals who are well-versed in:

- Calculation methodologies for the derivation of protection setpoints
- Settings software and logic conventions available from protective relay manufacturers
- Power system analysis software which is commonly utilized in determination of fault currents and in the coordination of overcurrent protection
- Protection settings troubleshooting, including familiarity with event record analysis tools

## Customizable Process Maps

Each substation owner has unique protection schemes to accommodate its needs. Settings development has generic design conventions, but unique client needs can be overlooked when onboarding settings professionals. To facilitate onboarding and scaling of a protection team, a customized process map is created for each client documenting:

- Client guides and standards to utilize in each step of protection settings development
- Steps to perform to acquire information to facilitate settings development and settings issue procedures upon design completion

- Typical schedule timeframes for each development step to ensure adequate schedule is budgeted

By documenting client procedures in a clear and concise process map, we have found that questions to clients relating to unique standards and procedures are limited.

## Up-to-Date Checklists and Guides

Protection settings and applications are constantly evolving to ensure reliability of the power system. With the development and implementation of NERC PRC standards, it is important that any protection Misoperation be analyzed with corrective action plans developed.

Because of these action plans, it is important that design processes allow for continuous process improvement. Black & Veatch continually updates QA checklists and design guides to accommodate lessons learned from internal independent design verification and external events (including client corrective action plans, standard updates and established limitations with protection equipment).

Protection designs are always accommodating the latest design guidance which limits risk exposure with settings developed by the Black & Veatch team. Along with continuous improvement, we subject all settings design tasks to independent design verification by a qualified peer within the settings team. Documentation of design verification is readily available, should a client request redlines or completed checklists with submission of protection designs.