


Staff Report

for the Board of Directors' Meeting of May 22, 2019

TO: Honorable Board of Directors

FROM: Keane Sommers, P.E., Hydroelectric Manager 
Matt Wheeler, P.E., Compliance Administrator

DATE: May 15, 2019

SUBJECT: Nevada Irrigation District Internal Compliance Program
2018 Compliance Risk Assessment Summary Report and Self
Certification (Consent)

HYDROELECTRIC

RECOMMENDATION:

Receive and file the 2018 Risk Assessment Report and Annual Self-Certification Summary, prepared in accordance with the Nevada Irrigation District Internal Compliance Program, as recommended by the Water and Hydroelectric Operations Committee.

BACKGROUND:

As authorized by NID Board Policy 9400, the NID Internal Compliance Program approved by the Board of Directors on January 22, 2014 requires that the results of the annual Self-Certification and Risk Assessment be presented to the Board of Directors.

Self-Certification Summary

As a North American Electric Reliability Corporation (NERC) Compliance Registry (NCR) Listed Entity, upon NERC notification NID must self-certify its current compliance status with specified NERC Reliability Standards. Self-Certification is an attestation of compliance or non-compliance with specified NERC Reliability Standards for a given time period.

In 2018 no self-certification was required by NERC via the Western Electricity Coordinating Council (WECC)/NID Compliance Oversight Plan. The next self-certification is due in 2020 for the 2019 compliance year.

Risk Assessment

Organizations with a strong risk management culture have successfully demonstrated that implementation of Internal Risk Controls Systems (IRCS) are integral to anticipate, predict, and govern operational and compliance risk elements. In its effort to implement such an IRCS, the NID Internal Compliance Program requires the NID Reliability Oversight Compliance Committee (ROCC) to commission an annual risk assessment that identifies weaknesses and vulnerabilities in NID hydroelectric reliability, compliance, and security positions.

In late 2018 and early 2019, NID and Grid Subject Matter Experts (GridSME) performed a risk assessment of the NID Hydroelectric Department reliability, compliance and security efforts. The risk assessment focused on the following five major components:

- Electricity Market Landscape
- People and Training
- Regulatory Environment
- Operating Environment
- Infrastructure and Technology

Results were documented in a Risk Assessment Report (attached) associated with current existing risks and the mitigation efforts deployed by NID.

Although NID has a low inherent risk to the Bulk Electric System (BES) due to its relatively small amount of electrical generation and its location on the Western Interconnection network topology, NID is not free from the risk to its organization, community, or BES that is evoked by the regulatory, staffing, equipment and external challenges identified in the 2018 Risk Assessment Report. With the key risk areas identified, NID will continue to move forward with risk prioritization, reduction, mitigation and elimination efforts.

Staff presented the information and report at the April 9, 2019 Water and Hydroelectric Operation Committee (WHO Committee) for discussion. The WHO Committee received the information and recommended staff present the report to the full Board of Directors as a receive and file item.

BUDGETARY IMPACT:

No budgetary impact.

KSS

Attachments (1):

NID 2018 Annual Risk Assessment Report

NID Hydroelectric Department 2018 Annual Risk Assessment

2/4/2019

Grid Subject Matter Experts

This report presents the findings of the annual tabletop risk assessment exercise performed by key NID Hydroelectric Department personnel and GridSME

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Executive Summary

The Nevada Irrigation District's Hydroelectric division ("NID Hydro") faces a variety of risks that could, individually or collectively, threaten the organization's ability to meet its objectives. This report identifies and assesses the most prominent risks, provides an update on status relative to prior years, and offers recommendations for how NID Hydro can mitigate those risks.

The following five categories were identified during the 2018 risk assessment. The themes are generally consistent with prior years, but the ranking has changed. Also, the recent Pacific Gas and Electric (PG&E) bankruptcy filing has presented a new risk factor for NID Hydro.

1. Electricity Market Landscape (e.g., PG&E bankruptcy)
2. People and Training
3. Regulatory Environment
4. Operating Environment (e.g., wildfires)
5. Infrastructure and Technology

On January 29, 2019 Pacific Gas & Electric filed for bankruptcy. The Electricity Market Landscape changed dramatically at that point and must be closely monitored. Results of the bankruptcy proceedings have the potential to impact everything from existing Power Purchase Agreements (PPA's) to the wholesale energy market.

NID Hydro continues to have significant risks in the People and Training category including a lack of bench strength in certain key areas, talent recruitment and retention, personnel training, and an aging workforce. NID Hydro experienced a couple of wins in the talent recruitment area with the addition of highly-skilled people in 2018. However, NID Hydro's ability to train its less experienced employees continues to be a critical risk and could face a new challenge as PG&E reorganizes its business. If unmitigated, the combination of these personnel risk factors could materially impact the operating effectiveness of NID Hydro. Bringing the right people into the organization, training them, building redundancy in a few key areas, and retaining them are fundamental to managing all other risks.

Prominent regulatory risks include the Federal Energy Regulatory Commission (FERC) dam safety requirements, the North American Electric Reliability Corporation (NERC) Reliability Standards, and the associated pace of change and continuous demands of each. The FERC dam safety regulatory oversight has increased significantly and managing the volume of work in this area is a challenge. At the very least, the sheer volume of regulation culminates in a significant strain on NID Hydro resources to monitor and stay apprised of regulatory changes.

Operating Environment

This risk assessment also identifies a variety of risks that reside within NID Hydro's equipment and technology infrastructure. To maintain the reliability of its aging infrastructure, NID Hydro implemented a Capital Improvement Plan in 2017 to strengthen the planning and capital budgeting process for major projects anticipated over the next 5 to 10 years. If not well-planned and executed, these projects have the potential to adversely impact NID Hydro's ability to meet its operating and financial objectives. By systematically and thoroughly planning projects, NID Hydro gives itself the opportunity to identify and mitigate risks early. Long-term strategic planning also allows NID Hydro to respond to evolving risks

throughout a project's lifecycle. The addition of the Deer Creek Powerhouse and associated canal adds another significant piece of infrastructure that must be maintained and operated.

While faced with numerous and potentially significant inherent risks, NID Hydro continues to make a concerted effort to actively manage its risk profile. Organizations with strong risk management cultures and well-designed and implemented internal controls can effectively anticipate and mitigate risk. Given the size and complexity of NID Hydro's operations, the consequences of unmanaged risk can be catastrophic.

Failing to identify and manage such risks often prevents organizations from reaching their reliability and compliance objectives. The effective deployment of strong Internal Risk Control Systems (IRCS) and risk management tools helps organizations identify latent organizational weaknesses, the potential for human behaviors to drift from expectations, and external risk factors. Risk management programs are the foundation to a business resiliency plan. This annual risk assessment represents one of many steps NID Hydro takes to maintain an effective IRCS and mitigate risk.

Risk Assessment

In December 2018, GridSME met with several key NID Hydroelectric Department ("NID Hydro") management personnel to discuss and assess current and potential risk factors facing NID Hydro operations. As part of this assessment, GridSME interviewed the Hydroelectric Manager, the Hydroelectric Compliance Administrator, the Senior Hydroelectric System Technician, the Hydroelectric Generation Superintendent, the Hydroelectric Maintenance Superintendent, and the Senior Engineer – Dam Safety. This table-top risk assessment exercise identified five main risk categories facing NID Hydro listed in priority ranked order below:

1. Electricity Market Landscape (e.g., PG&E bankruptcy)
2. People and Training
3. Regulatory Environment
4. Operating Environment (e.g., wildfires)
5. Equipment and Technology

A variety of specific risks reside within each category. Interdependencies exist among the risk categories, and certain risks can positively or negatively impact other risks. This risk assessment identifies the risks believed to be most probable or most impactful to NID Hydro.

Electricity Market Landscape

PG&E Declares Chapter 11 Bankruptcy

On January 29, 2019, saddled with at least \$30 billion in projected liabilities from recent wildfires its equipment is claimed to have started, PG&E declared Chapter 11 bankruptcy. Under bankruptcy, the utility not only looks to sell certain assets, shed liabilities, and reform its business model, it will also attempt to unwind some of its above-market power purchase agreements (PPA).¹ The utility disclosed it has 387 PPA's that total approximately \$42 billion in future payments – not a liability on its balance sheet, but certainly an amount the utility would like to restructure and reduce. Among the PPA's are many with

¹ Mullin, Robert, Sangree, Hudson. (2019, January 29). PG&E Wants to Undo Contracts, Revamp Biz in Bankruptcy. Rtoinsider.com.

renewable generators signed earlier this decade or late the prior decade with solar generators. Prices for those technologies have dropped dramatically, leaving PG&E in a poor position to compete with Community Choice Aggregators (CCA) for customers. FERC filed two recent rulings stating it shares authority with the bankruptcy judge in determining if PPA's can be repealed or modified in bankruptcy, which is favorable for generators.

As a PPA counterparty to PG&E, these developments certainly have NID Hydro's attention. PG&E heavily procured renewables, primarily solar PV, in the early and mid-part of the decade and now finds itself oversubscribed to renewables with mostly above-market contracts. The first PPA's PG&E is likely to challenge will be those in ConEdison, NextEra, and others' renewable portfolios at rates approaching \$200/MWh.² PG&E simply needs less power generation from midday peaking (i.e., solar PV) generators and needs to drive down its procurement costs. While NID's PPA's with PG&E are at risk, there are two factors working in its favor. First, FERC will try to interject in the bankruptcy process when it comes to handling PPA's. This is likely to be in generators' favor as unilaterally amending or repealing PPA's undermines the integrity of wholesale electricity markets. Second, NID Hydro's portfolio energy profile and PPA price is more favorable to PG&E than most contracts in PG&E's portfolio. In addition to its energy output, PG&E monetizes ancillary services, resource adequacy, and environmental attributes from NID Hydro's resources. Considering that PG&E does still need to procure renewables and zero-greenhouse gas (GHG) resources to serve its load and meet state requirements and given NID Hydro's diverse profile attributes relative to intermittent renewables, there are reasons to believe PG&E will not try to restructure NID Hydro's PPA's. However, should PG&E choose to challenge NID's PPA's, the District will be facing significant legal costs and potentially significantly reduced revenues. NID must protect itself and actively participate in the bankruptcy proceedings.

General Wholesale Market Trends

Especially considering PG&E's bankruptcy filing, it is important for NID Hydro to understand developments in the CAISO wholesale electricity markets. 2018 saw continued penetration of intermittent renewables (e.g., solar and wind) on the CAISO system. Prices remained relatively low, but the third quarter did experience a sharp increase in wholesale electricity prices, particularly in Southern California, due to natural gas transport constraints, which has been an ongoing challenge for several years. Intermittent renewable penetration and natural gas constraints continued to increase the intraday volatility of wholesale electricity market prices. The installed cost of intermittent renewables, namely photovoltaic (PV) solar, and energy storage technologies, namely lithium-ion batteries, continued to decline as well. These two technologies are suppressing midday wholesale electricity market prices and driving down PPA prices across the country, particularly in California. However, the United States imposed a 30% Section 201 import tariff in January 2018 on imported solar PV panels. In the short-term, this put some upward pricing pressure on new power contracts for solar and slowed project development, but these factors are not expected to be lasting or material.

In addition to generally low but volatile wholesale electricity market prices, distributed generation (e.g., rooftop solar), behind-the-meter battery storage technologies, and the evolution of CCA's are reducing most utilities' (e.g., PG&E and municipal utilities) load profile. These factors are resulting in shrinking loads, declining wholesale electricity market prices, localized over-generation situations, and an increase

² St. John, Jeff. (2018, November 20). If Wildfires Drive PG&E Into Bankruptcy, What Happens to Renewable Energy Contracts? Greentechmedia.com.

in generator curtailments. The culmination of these factors has led to a very saturated and highly-competitive market. Many power generators are eagerly searching for power off-takers (i.e., buyers) both in the long-term and the near-term. Although volatility continues to increase, the frequency of negative energy prices declined in 2018 compared to 2017 due to the decline in hydro production year-over-year. Another favorable trend for flexible and dispatchable generation is increasing ancillary service (e.g., spinning reserves, regulation up, and regulation down) prices, which continued to tick-up in 2018.

Chicago Park and Dutch Flat #2 are both under long-term power contracts with PG&E with contract expiration approximately 14 years out. NID Hydro's smaller plants face expiring contracts in the next one to four years, and these electricity market forces will shape the future economics of those projects. These market forces have put downward pressure on NID Hydro's long-term revenue generation potential. The changing power grid dynamics could incentivize NID Hydro to operate some of its hydro resources under different operating profiles in the future, including a more flexible and dispatchable profile. Figure 1 below presents 2018's average hour-by-hour day-ahead (DA), fifteen-minute market (FMM), and five-minute market (5MM) wholesale electricity prices in CAISO's Northern California territory. As can be seen, the disparity between high and low prices continues to increase with the lowest pricing consistently experienced in the middle of the day (i.e., peak solar PV generation). Figure 2 shows energy and ancillary service prices by month in 2018, illustrating the price spikes in July and August at the SoCal CityGate natural gas hub. To California, these natural gas price spikes are reminders of the need to reduce its dependency on gas to serve baseload and peaking energy needs. This presents a great opportunity for hydro to increase its role and importance in California's energy portfolio. NID Hydro is contemplating how, and by how much, it can vary its generators' production and water flows intraday, provide ancillary services, and shift more generation and water flow into peak pricing hours.

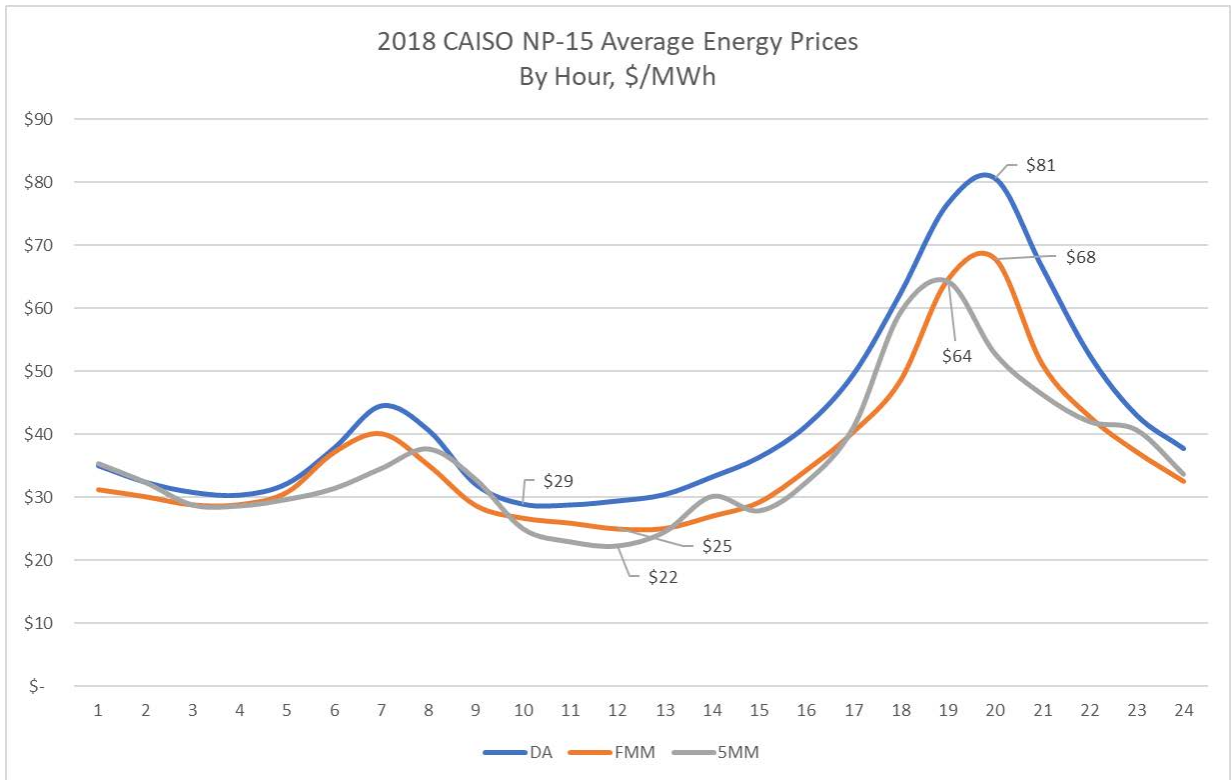


Figure 1: CAISO North Path 15 (NP-15) 2018 Average Electricity Prices by Hour

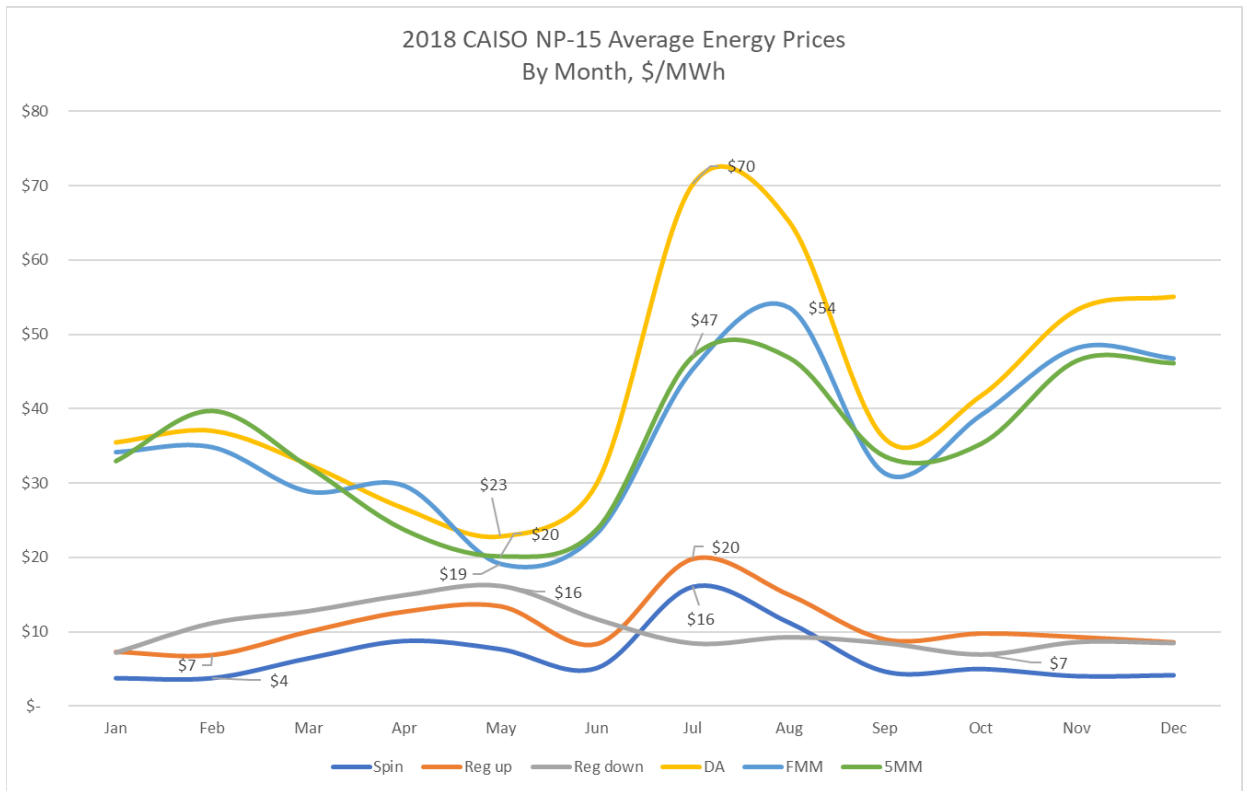


Figure 2: CAISO NP-15 2018 Average Electricity Prices by Month

Hydro generation has many advantages over traditional fossil fuel generation and intermittent renewable generation – the two technologies that shape wholesale market prices. These advantages are presented in Table 1 below.

Criteria	Existing Hydro	Intermittent Renewables	Natural Gas
Capacity Factor	✓	X	✓+
Effective Load Carrying Capability (ELCC)	✓	X	✓+
Ability to Offer Ancillary Services	✓	X	✓
Dispatchable	✓	X	✓
Project Viability & Financing	✓	X	✓
Renewable	✓ ³	✓	X
Zero-GHG	✓	✓	X

Table 1: Hydro Advantages vs. Competing Generation Technologies

For these reasons, hydro is a good renewable and zero-GHG electricity supply partner to California’s growing population of CCA’s. NID Hydro has begun taking steps to re-contract its generators with upcoming contract expirations and consider the generators’ ability to adapt to the changing landscape and operate under more variable generation profiles that provide both energy and ancillary services to the markets.

The current state and evolution of the electricity markets are important for another reason. Earlier this decade, Northern California experienced an exceptional and prolonged drought, as well as a record precipitation year. It is evident that NID Hydro will not always be able to rely on snow pack for power generation. Historically, drought conditions had minimal financial impact on NID Hydro because of the structure of its power contracts. These power contracts incentivize and compensate generators based on availability. However, as the current power contracts begin to expire and NID Hydro re-contracts its power under market-based and quantity-based structures (i.e., per MWh basis), drought conditions could pose a significant financial risk to NID Hydro.

People and Training

Our risk assessment process identified several key risks facing NID Hydro’s ability to recruit, train, and retain the workforce necessary to operate and maintain its hydroelectric infrastructure. These risks include workplace safety, talent recruitment and retention, personnel training, and a lack of bench strength.

Workplace Safety

It is evident that workplace safety is NID Hydro’s top priority and receives the attention required. However, consistent with prior years, NID Hydro personnel noted that although they possess knowledge and expertise in general industrial workplace safety, there is limited expertise on electrical safety. In addition, NID Hydro believes its safety program could be further improved by having a dedicated safety coordinator focused on the industrial and electrical safety aspects of NID Hydro’s operating environment. NID Hydro should consider bolstering its electrical safety program. NID Hydro is currently pursuing an

³ Assuming RPS-eligible small hydro less than 30 MW’s.

external broad industrial safety consultant who would have a considerable focus on hydro operations, in addition to the water and recreation departments.

Personnel Training

In 2018, NID Hydro continued to build its workforce training and development programs. NID Hydro sees a well-trained and prepared workforce as essential to maintaining its infrastructure and uninterrupted operations. NID Hydro also recognizes that a well-developed training program must contain both internal and external components. Internal training is necessary to prepare the workforce for the operating environment, activities, and scenarios unique to NID Hydro. External training is essential to gain exposure to proven industry best practices, external viewpoints, and new developments. Access to external training continues to be a key risk factor facing NID Hydro and other water agencies in Northern California.

Operations

For its operations personnel, NID Hydro remains heavily dependent on PG&E's hydro operations training program. NID Hydro has a long history of using PG&E's training program to qualify its operators. This training program has been extremely beneficial for NID Hydro and its personnel. Because of this, in 2016, NID Hydro cited the potential loss of an adequate training program as a major risk facing NID Hydro and began taking long-term steps to mitigate this risk since that time.

Absent access to PG&E's training program, NID Hydro would be forced to look for other hydro training programs. Interviewees identified the closest equivalent training program to reside in Colorado, but the quality and the depth of the training is far inferior to the PG&E training program. This is a single-contingency risk with considerable downside to NID Hydro. PG&E's recent Chapter 11 bankruptcy filing could accelerate this risk depending on how the company is reorganized and what it looks like post-bankruptcy.

Accordingly, NID Hydro began taking steps in 2017 to mitigate this risk with a contingency plan. This is no small effort, and will take years to develop, but is essential should NID Hydro lose access to PG&E's operations training program. NID Hydro has also had preliminary discussions with neighboring water agencies (e.g., Placer County Water Agency, Yuba County Water Agency, Merced Irrigation District, etc.) about forming a training partnership to pool resources and form a shared training program. There is mutual interest in this effort, but resources are scarce across the agencies, and NID Hydro cannot not rely on third-parties alone to mitigate this risk.

Maintenance

Currently, the maintenance department (machinists and technicians) relies mostly on external training classes and vendor training programs. In prior years' risk assessment it was noted that, unlike the operations staff, the maintenance department lacks a formal systematic training program, instead relying on a mostly ad hoc approach. In 2017, NID Hydro made a concerted effort to begin developing a structured and systematic training program for the machinists and technicians. This maintenance department training program consists of both third-party and internally-provided training courses. 2018 saw progress on this initiative and it will continue into 2019.

Talent Recruitment and Retention

Consistent with the prior years' risk assessment, talent recruitment and retention remains a significant risk to NID Hydro's continued success. Although employee turnover declined in 2017 and 2018, fears remain that NID Hydro is in a weak position to retain and recruit outstanding talent. To make NID Hydro

more competitive with the labor market, NID Hydro received a modest market adjustment in 2017. Although appreciative, several interviewees believe Hydro is still susceptible to employee turnover if it remains below market averages. As noted in prior years, it is believed that the pay rates at hydro divisions of nearby water agencies are 10% to 20% higher than NID Hydro's average pay rate. A market compensation survey is planned in the first quarter of 2019, which will be considered during Union MOU negotiations in 2020. However, at the February 13 Board or Directors meeting the Board discussed the potential of reducing cost of living adjustments and the potential of salary cuts prior to rate increases was mentioned. The statement was noted by employees and had a significant impact on morale which in turn may have an impact on recruitment and retention.

The impact of lower pay rates will become more impactful as retirements increase and the workforce age and tenure decline. While personnel nearing retirement are disinclined to leave a job simply for better near-term pay, a younger, well-trained workforce are far more prone to seek immediate pay raises simply by changing employer.

Due to likely retirements and general workforce attrition, NID Hydro is likely to lose a meaningful portion of its workforce over the next half-decade as approximately twenty percent of NID Hydro's workforce is within five years of retirement age. High employee turnover has the potential to exacerbate other risk factors facing NID Hydro as addressed within this report. These include employee safety, personnel training, equipment maintenance, and regulatory compliance. These risks become more difficult to manage, more present, and more impactful when organizations lack skilled, experienced, and well-trained people.

Facing the risk of high employee turnover, organizations should not only develop an employee retention strategy, but also institute succession planning. Faced with the real possibility of a twenty percent employee turnover rate, NID Hydro should place more attention on succession planning at all levels of the department. Succession planning is a tool used to develop the right competencies and leadership attributes at all levels of the organization. In addition, a succession plan also identifies where the lack of bench strength creates single-contingency risks (i.e., surprise departures with no backup).

Should NID Hydro experience increased turnover in the years ahead, which is likely inevitable given retirements, interviewees expressed a concern about NID Hydro's ability to find and recruit experienced and qualified staff. It is believed that the overall workforce is not sufficiently deep in terms of the industrial trades. This external factor places even more emphasis on the importance of well-developed employee retention and succession plans.

Succession Planning

The risk of turnover and a challenging recruiting environment make succession planning a key initiative in maintaining an adequate workforce. The interviewees are all mindful of this need, and there are efforts being made to develop the bench strength.

For Hydro Operations specifically, succession planning is a common risk factor mentioned during the interviews. The identification of this risk is an important and necessary first step to mitigating the risk. The risk is two-fold. First, there is a concern that the operations department lacks strong candidates interested in a future leadership role in the department. Second, it is widely believed operators take five years to get their feet under them and move into "experienced" status. Because of the time required for operators to reach "experienced" status, this puts NID Hydro at risk when turnover does occur.

The Hydro Maintenance Department practices back-filling and cross-training to cover vacations. The department is also looking ahead 5 to 10 years and identifying the personnel that will be able to step-up into more experienced and skilled roles. This exercise also touches training program development, which is a critical step in succession planning. To grow its bench strength, NID Hydro must know what skills they need at the next level and the training and on-the-job experience required to get there.

Organizational Culture

NID Hydro possesses a strong culture of compliance which continues to mature. 2018 saw the organization continue to build that culture, but there is still more room for growth. NID Hydro has been focused on correcting legacy “shortcut” and “tribal knowledge” behaviors. This is especially important as the organization experiences an increased regulatory burden from FERC, a SCADA system replacement, and emerging cyber security threats. The correct mindset, documentation, and compliance practices will be especially important for NID Hydro as the regulatory burden and cyber security risks continue to escalate. A weak spot in the culture is perhaps in the documentation and procedure-based habits. Interviewees noted this is one area with considerable room for growth. Diligent documentation and the adherence to well-designed procedures is especially important in an invasive regulatory environment. Of course, improvements in this area are dependent on having sufficient resources to execute the procedures and document the work.

Organizational Structure and Staffing

While the budgeted headcount in the Department has not changed NID Hydro has undergone significant changes in Organizational Structure and Staffing in the last 18 months. NID Hydro was able to recruit an external entry level Communications Technician in late 2017 and temporarily retained the services of an experienced external Senior Electrical Systems Technician in mid-2018. The Senior Electrical Systems Technician was hired as a permanent employee in early 2019. The Department also added a Hydroelectric Plant Operator, Hydrographer, Compliance Technician, Management Assistant, and Water System Operator in 2018. The Department lost an experienced Communications Technician, Senior Hydrographer, and Hydroelectric Plant Operator in 2018 as well as a Hydroelectric Plant Operator and Compliance Administrator in early 2019. The loss of the Compliance Administrator has had a particularly significant impact on the Department as the regulatory world constantly changes and the Compliance group operates on minimal staffing.

The Hydro Operations and Maintenance Departments have experienced significant growth in workforce with no associated increase in supervision. The nationally recognized Incident Command System (ICS) suggests that between 3 and 7 subordinates is the appropriate range for supervisors. Five is often recommended as the optimal number. Without any intermediate supervisors the Hydroelectric Maintenance Superintendent has direct supervision over eleven subordinates and the Hydroelectric Generation Superintendent has direct supervision over eight subordinates. NID Hydro should reevaluate supervision requirements to ensure adequate oversight of staff work is maintained.

Regulatory Environment

Regulatory risks facing NID Hydro continue to build with FERC Dam Safety as the biggest contributor in 2018. The fallout from the February 2017 Oroville Emergency Spillway incident has peaked regulatory scrutiny in this area, and dramatically increased the demands on NID Hydro. Complying with regulatory requirements is mandatory, but keeping up with changes, maintaining sufficient documentation, and

responding to regulator inquiries demands significant attention and resources. Consequently, the risk of misstep poses financial and reputational risks to NID.

In addition to FERC and NERC, NID Hydro is regulated by the California Legislature, the California Energy Commission (CEC) (e.g., rules regarding how traditional hydroelectric power generation will be treated or viewed by load-serving entities and in the energy markets), the California and Federal Environmental Protection Agencies (EPA), and the Occupational Safety and Health Administration (OSHA), among others.

All forms of regulatory compliance place a heavy burden on NID Hydro and stretches its resources thin. The organization can expect the burden to increase in the years ahead. Maintaining compliance requires the organization's full attention, as well as a system of documented processes, procedures, and internal controls. Most importantly, the regulatory burden requires NID Hydro to build and sustain a culture of compliance lived daily by its people. The organization leverages this annual risk assessment process to inventory and assess the organization's regulatory compliance burden and assess whether sufficient resources exist to meet that burden. Based on this risk assessment, GridSME believes that NID Hydro's resource capacity to meet the organization's regulatory compliance burden is no longer sufficient due to three primary drivers. These three drivers include:

1. Increased FERC oversight and scrutiny;
2. A growing infrastructure footprint (addressed in the Infrastructure and Technology section below); and
3. An evolving NERC compliance burden, coupled with turnover in the Compliance Administrator position.

FERC Regulatory Compliance

Perhaps the biggest regulatory risk facing NID today includes decisions or initiatives at FERC, such as reliability, security initiatives, dam safety, environmental, compliance, and re-licensing. FERC scrutiny and oversight dramatically increased in 2017. At nearly the same time as the Oroville Dam spillway failure in February 2017, FERC's scrutiny of NID Hydro's activities began to increase. FERC reacted in an extreme manner and now requires NID Hydro to notify the Commission before performing a maintenance event, no matter the nature of the activity. In the past, NID Hydro would identify a maintenance need and address the issue, as soon as possible. Now, NID Hydro must notify FERC, and allow FERC to review and ask questions during a 60-day review window. This not only slows down reaction time to operations and maintenance needs, it also consumes administrative resources and requires those resources to react very quickly to minimize FERC review delays. Given the increased FERC scrutiny, record-keeping and document retention are more important than ever before.

Specifically, FERC has focused much of its attention on probable spillway failure assessments. Since early 2017, six NID Hydro spillways have come under review, which requires significant attention from NID Hydro resources. In particular, the Scott's Flat spillway requires work and NID Hydro resources have been allocated to that project. The culmination of regulatory reaction and aging infrastructure has placed a significant strain on NID Hydro operations, maintenance, and administrative resources to keep-up with regulator demands and increased project workload. NID Hydro is also thin on resources in this area. NID Hydro lacks bench strength behind its Senior Engineer of Dam Safety.

NERC Regulatory Compliance

Compliance and reliability risks associated with the NERC Reliability Standards, the Western Electricity Coordinating Council (WECC) Regional Standards, and their collective enforcement, continues to have the full attention of NID Hydro. To address this obligation, NID Hydro’s Internal Compliance Program (ICP) directs the organization to perform a risk assessment annually. NERC and WECC are very focused on identifying and reducing risks to the Bulk Electric System (BES) and recommend that registered entities conduct regular risk assessments.

As the power grid evolves (e.g., increased intermittent renewable generation, retirement of many conventional generators, changing distribution system characteristics, ever-increasing cyber threats), NERC and the Regional Entities (e.g., WECC) work diligently to keep pace. This results in an ever-changing set of Reliability Standards constantly in-flux. NID Hydro’s registration as a Generator Owner (GO) and Generator Operator (GOP) equates to 183 currently applicable Reliability Standard Requirements and sub-Requirements.⁴ That presents 183 opportunities to “trip-up” and experience a compliance event, such as a compliance exception or compliance violation.

Complying with the currently enforceable Standards and Requirements is a significant undertaking. Adding to that burden are changes to the Reliability Standards and associated Requirements. Table 2 and Figure 3 below depict the total number of changes since NID Hydro’s registration in 2014. From NID’s registration until now, there have been 1,057 cumulative changes to the Requirements applicable to NID Hydro’s GO and GOP functional registrations. Years ago, NERC began talking about achieving a “steady state” with the Reliability Standards. As seen in Table 2 below, the Standards were hardly in a steady state until 2018 when activity did, at least temporarily, slow. 2018 saw a dramatic decrease in the number of Standard changes compared to prior years. However, the activity has already picked up in 2019 and more changes are expected.

	2014	2015	2016	2017	2018	2019 scheduled ⁵
Requirements that became Enforceable	68	70	134	120	5	22
Requirements that became Inactive	114	99	222	118	27	59
Total Changes	182	169	356	238	32	81
Total Cumulative Changes	182	351	707	945	977	1,058

Table 2: NERC Reliability Standard Requirement Changes, GO & GOP

⁴ A NERC Reliability Standard contains one or more individual Requirements and sub-Requirements applicable to certain NERC functional registrations, such as a GO or GOP.

⁵ Requirement changes already scheduled in 2019 as of February 1, 2019.

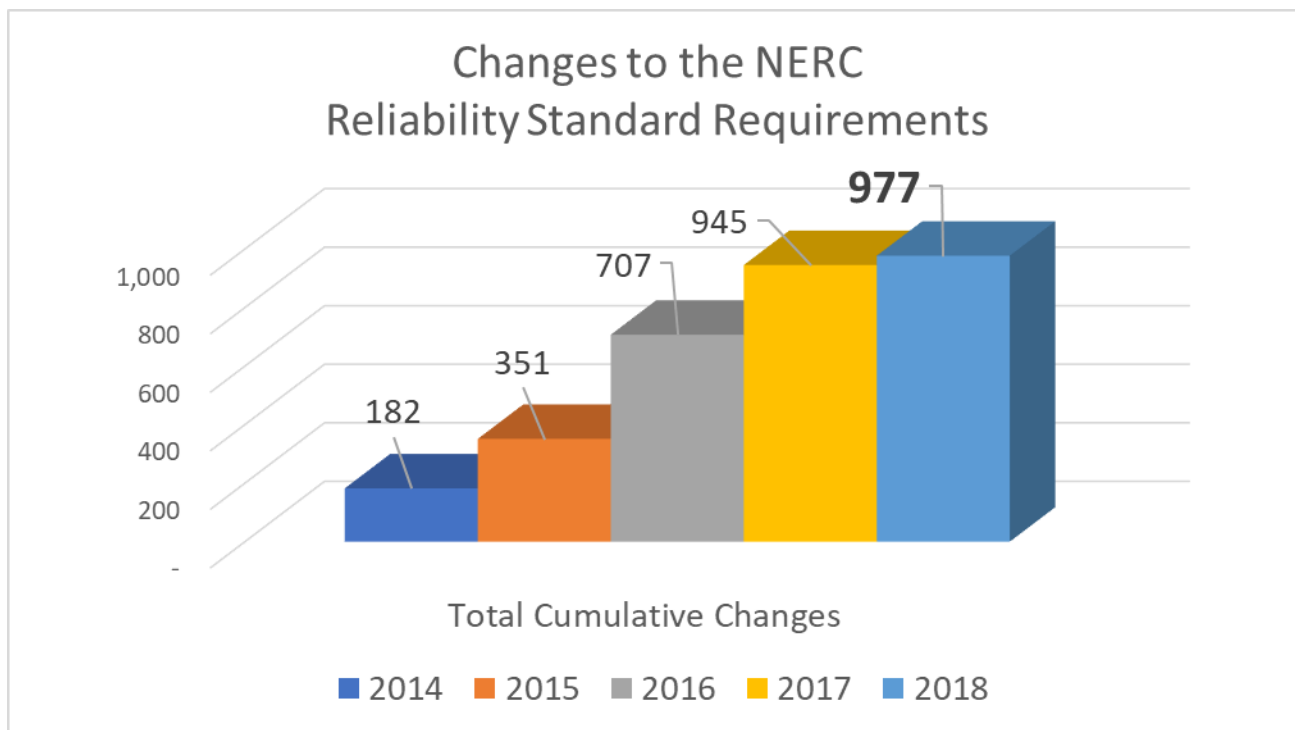


Figure 3: Cumulative Changes to NERC Reliability Standard Requirements

Specific NERC regulatory risks identified and discussed during our risk assessment include:

- The volume and constant changes to the NERC Reliability Standard Requirements
- Rate-of-change of the NERC Reliability Standard Requirements
- NERC Standard revisions with short compliance windows (e.g., VAR-501-WECC-3)
- Standard Requirements ambiguity and lack of clear guidance from NERC and WECC, in some cases
- Protection and Control Reliability Standard PRC-005: new Standard revisions, staying current on maintenance time requirements, and generating adequate evidence of maintenance activities
- Critical Infrastructure Protection Reliability Standard CIP-003 for low impact BES Cyber Systems
- Management of the PG&E Coordinated Functional Registration (CFR) agreement

Risk of Compliance Violations

A compliance violation often results in penalties that could, by law, reach \$1 million per violation per day. In reality, actual penalties for compliance violations do not approach this level, but are material nonetheless. Table 3 below provides examples of penalties levied in 2018 by FERC, NERC, and the Regional Entities for violations of GO and GOP-applicable Reliability Standards.

Examples of Recent NERC Penalties

Reliability Standard Violated	Reliability Standard Name	Nature of Violation	Penalty Amount
CIP-002 through CIP-011	Cyber Infrastructure Protection	The registered entity (RE) was found in violation of 127 CIP requirements, caused by lack of managerial oversight, process deficiencies, inadequate training and lack of internal controls.	\$10,000,000
CIP-003	Security Management Controls	The RE was fined for improperly managing its sensitive data. Some of its sensitive data was available for download for two months due to poor cyber security controls.	\$2,700,000
FAC-003	Vegetation Management	The RE identified a tree that had encroached the minimum vegetation clearing distance of a 345-kV transmission line causing an outage.	\$300,000
FAC-009	Establish and Communicate Facility Ratings	The RE did not establish Facility Ratings for its solely and jointly owned Facilities that are consistent with the associated Facility Ratings Methodology.	\$225,000
CIP-003, CIP-004, CIP-006, CIP-007, CIP-010	Cyber Infrastructure Protection	The RE had numerous CIP violations, including a lack of a implemented change control and configuration management program, as well as visitor logging infractions at their control center.	\$220,000
FAC-003	Vegetation Management	The RE did not maintain Minimum Vegetation Clearance Distance near its lines, leading to a vegetation-caused fault.	\$120,000
FAC-008	Facility Ratings	The RE failed to identify the most limiting element for one of its facilities and failed to establish Facility Ratings that were consistent with the associated Facility Ratings Methodology.	\$60,000
PRC-019	Coordination of Generating Unit or Plant Capabilities, Voltage Regulating Controls, and Protection	The RE did not coordinate the voltage regulating system controls with the applicable equipment capabilities and settings of the applicable Protection System devices and functions for its generating units.	\$60,000

Table 3: Examples of 2018 Reliability Standard Violations and Penalties

Often, compliance violations are far more than the amount of the NERC penalty. Violations also require entities to allocate considerable resources to report, negotiate, and mitigate the non-compliance event. Other indirect costs to compliance violations include reputational costs, increased regulatory scrutiny (e.g., more frequent spot checks and a shorter audit cycle), and a less forgiving regulator during future compliance events.

In 2018, NID did not experience any self-reports or notice of potential violations. The PRC-019 self-report filed in September 2017 was closed-out in September 2018 when WECC declared the self-report to be a compliance exception meaning no enforcement action will come from the non-compliance event.

Another NERC compliance challenge experienced in 2018 was the result of a Standard revision, VAR-501-WECC-3, that became enforceable on July 1, 2017. This revised Standard included a new Requirement that requires a GO replacing its excitation system to also install a Power System Stabilizer (PSS) within 180 days of excitation system replacement. This Standard came into effect very quickly (approved by FERC just two months prior) and required NID Hydro to immediately update its maintenance and capital investment plans. These changes also necessitated the expenditure of a material amount of capital, and the addition of an outage in the first quarter of 2018 to activate the PSS capability on the Dutch Flat #2 unit. NID successfully responded to this new Standard Requirement and installed the PSS capability at Dutch Flat #2 in February 2018. But at a cost to its other standard maintenance obligations due to limited staff resources.

Looking ahead to 2019, a few of the currently-known key NERC compliance activities this year include:

- Updating and executing a revised Coordinated Functional Registration (CFR) with PG&E
- Development and implementation of updated Cyber Security policies to meet the additional physical and interactive remote access requirements of CIP-003 scheduled for enforcement on January 1, 2020
- Continued management and execution of the PRC-005 Protection System Maintenance Program, including performance of 6-year maintenance cycle activities on its in-scope elements
- Verification of PRC-025 compliance for the new Chicago Park relays before October 1, 2019
- Updating procedure and attestation documentation for scheduled Standard and Requirement revisions
- Compliance with CAISO generator modeling and data submittal requirements; non-NERC jurisdiction but CAISO Tariff-enforceable

In addition to these activities that are known and predictable, there are many routine reporting and administrative activities that NID Hydro will continue to perform. Further, it remains highly probable that 2019 will also see regulatory inquiries, additional Reliability Standards changes, and O&M events that require compliance responses.

The speed-of-change, the constant need to monitor NERC activity, and the importance of taking timely action culminate in a significant inherent risk to NID Hydro's compliance program. To address this ever-present risk, in 2014, NID Hydro implemented a formal Internal Compliance Program (ICP) carried-out by the Reliability Oversight Compliance Committee (ROCC) which meets quarterly to review recent NERC developments, review activities, and plan action items for the upcoming quarter(s). However, given the many other demands placed on NID Hydro resources, none of the ROCC members are able to dedicate significant time to NERC activities. NID Hydro also experienced turnover in the Compliance Administrator

position in early 2019, which will present a new challenge for NID Hydro. The organization has taken resources from other assignments and was forced to outsource a significant portion of the compliance activities in an effort to ensure compliance is maintained.

Operating Environment

The remote and rural nature of NID Hydro's operating environment presents many inherent risks. These include personnel safety, severe weather, the physical security of the infrastructure, wildfires, and vegetation management. This was made evident in 2017 as an extremely wet winter and spring took its toll on the terrain in and around NID Hydro's footprint. In addition, the growing threat of cyber-attacks on the U.S. power grid and those generators connected to it presents an ever-present risk to NID Hydro.

Personnel Safety

Several of the interviewees stressed personnel safety as the most important risk facing NID Hydro. The 2017 Risk Assessment recommended pursuing a safety training consultant with considerable focus on hydroelectric operations. Staff developed a Request for Proposals (RFP) to retain the services of a safety consultant and intends to release the RFP in the first quarter of 2019.

Given the remote working environments and unforeseen weather conditions common in the Western Sierras, constantly exposing personnel to these elements presents a significant risk. Because of this, NID Hydro operations and maintenance crews make a concerted effort to prepare in advance of incoming storms, deploy the buddy system whenever possible, and take preventive measures.

Physical Security

Given NID Hydro's remote infrastructure, it has experienced many threats to its physical security, and this is not likely to change. To address this risk, Hydro has taken many steps to improve the physical security of its infrastructure. This includes installing all new lock cores in 2016 and plans to install card readers in the powerhouses in 2019.

Although not part of NID Hydro's NERC compliance footprint the Scotts Flat Dam presents a unique physical security situation. In August, 2017, NID installed fencing and a gate across a portion of the top and along the edge of the Scott's Flat Spillway in an effort to safeguard the District against regulatory concerns as well as public health & safety hazards. During a Special Board Meeting on November 17, 2017 the Board of Directors required that the gate at Scotts Flat be opened. This has presented a unique set of physical security threats to the District's operations that must be mitigated and must not be allowed to spread to NERC registered facilities. Staff is currently working to develop a fencing plan that will be acceptable to the Federal Energy Regulatory Commission, the California Division of Safety of Dams and the Board of Directors.

Wildfires and Vegetation Management

Although NID Hydro's infrastructure was fortunate to avoid wildfires in recent years, the risk of sustained damage from one or more wildfires is ever-increasing with each passing year. In addition, and as demonstrated by PG&E, perhaps the biggest risk is NID Hydro's equipment starting a wildfire. The wilderness surrounding NID Hydro's infrastructure poses two risk factors. The first is the ever-present wildfire risk during the annual dry season in the summer and fall. The second risk factor is vegetation management to both mitigate the risk of igniting a wildfire and to minimize the impact if a wildfire occurs in the nearby area.

Vegetation management remains very important and very challenging. The interviewees identified this as an area where NID Hydro needs continued improvement. Diligent vegetation management requires a systematic and proactive approach to continuously identify maintenance areas, manage the third-party coordination and approval process, and then schedule and perform the work. Examples of vegetation management needs include areas around and under transmission lines, penstocks, and flumes. As many of NID Hydro's projects reside on federal land, this creates unique challenges for maintaining the vegetation. NID Hydro must navigate federal rules and regulations. Some of its infrastructure resides on land owned by the Bureau of Land Management (BLM), and some owned by the Forest Service. Both BLM and Forest Service approval and compliance is a continuous obstacle for NID Hydro and slow to overcome. Although obvious needs exist to cut-back and more proactively manage vegetation around its infrastructure, NID Hydro must be diligent about the process to gain timely approvals and cooperation from third-parties. This creates just as much of an administrative burden for NID Hydro as it does a maintenance burden. Having sufficient workforce resources to timely identify, manage, and address vegetation risks is critical for NID Hydro.

In addition, the treacherous terrain and access barriers pose significant challenges to staying on top of NID Hydro's vegetation management efforts. As discussed previously, these risk factors require prudent vegetation management in the areas surrounding NID Hydro's infrastructure. This is easier said than done. Even with diligent vegetation management practices, it is almost inevitable that a wildfire will threaten NID Hydro's infrastructure.

Cyber Security

Cyber-attacks in the power industry and throughout the world are becoming more prevalent. The power grid is now a prominent and high value target. Whether it is enemy state and terrorist motivations, monetary gain (i.e., ransomware), or simply "because I can" motivations, cyber-attacks are a real threat to the security of the power grid operators and power generators. Examples of cyber-attacks in recent years include the Iranian "hactivist" group intruding a New York dam's SCADA system in 2013, the December 2015 hack of Ukraine's power grid which caused a major blackout, and the second, even more sophisticated December 2016 cyber-attack on Ukraine's power grid.

Consistent with prior years' risk assessment, NID Hydro interviewees are very mindful of the ever-increasing cyber risks facing the industry and NID Hydro's infrastructure. Recent cyber-attacks on critical infrastructure throughout the world have made the risk very apparent. There is no doubt that nations hostile to the U.S. and independent malicious hackers are targeting the cyber assets that generate electricity and operate the power grid. Hydro assets are certainly a target, not only because of their contributions to power grid operations, but also because of the magnitude of destruction possible if the assets were compromised and misused.

NID Hydro's SCADA upgrade presents new inherent security risks to NID Hydro. The upgrade also presents an opportunity to design and install effective internal controls that protect the assets from cyber threats. NID Hydro is taking steps to develop and implement new policies and procedures for access management, change management, and disaster recovery for the new SCADA system. In addition to these controls, NID Hydro should also consider developing and implementing network security controls, including, but not limited to, activity logging and review, patch management, and periodic cyber vulnerability assessments.

The risk assessment interviewees believe NID Hydro has the appropriate cyber security expertise. However, they believe the Hydro division lacks sufficient depth of cyber security expertise to maintain a hardened infrastructure. Currently, NID Hydro relies solely on the Grass Valley Information Technology (IT) department which has its own staffing limitations. There exists very little bench strength which leaves NID Hydro with a single contingency point-of-failure.

To ensure it has adequate and redundant staffing around SCADA system network management and cyber security, NID Hydro will need to establish roles and responsibilities in these areas. This is an area that NID Hydro should look closely at and evaluate whether the Hydro department has sufficient dedicated resources to manage its SCADA system.

Infrastructure and Technology

For multiple reasons, NID Hydro's infrastructure and technology present high inherent risks. First, the age of the infrastructure requires constant maintenance. Because of this, NID has heightened its focus and efforts in several areas, including project planning, computerized maintenance management system, electrical documentation, spare parts, and its technology. The second driving risk factor is NID's planned addition of the Deer Creek Powerhouse (DCPH) to its portfolio in late 2019.

Aging Infrastructure

Although the industry has seen well-maintained hydro generation facilities perform reliably for nearly a century, NID Hydro's infrastructure does present a significant risk for multiple reasons. First and most obvious, older equipment is more susceptible to reliability issues, and requires more frequent maintenance intervals. Second, drawings of older equipment are often found to be inaccurate, which makes for difficult and time-consuming troubleshooting efforts. Third, the nature of the older equipment means troubleshooting is labor intensive, as compared to modern generation plants that are mostly digital. The culmination of these factors presents a major risk to NID Hydro's financial health should the availability and reliability of its equipment be compromised.

Consistent with prior year's risk assessment, interviewees expressed an appreciation for the organization's commitment to reinvesting in and maintaining its infrastructure. The NID Hydro personnel greatly appreciate the organization continuously investing capital in infrastructure maintenance and improvement projects. When a proposed project's benefit exceeds its cost, project funding is obtained.

Project Planning

To keep pace with the aging infrastructure, maintaining NID Hydro's historical reliability levels requires constant investment, project planning, and execution. Absent a well-planned and executed maintenance program supported by a CMMS, the continued high availability of NID Hydro's generation assets is doubtful. The size of NID Hydro's infrastructure and the high volume of projects necessitates thorough and focused planning. NID Hydro's maintenance program has a risk assessment process fundamentally built into it. NID Hydro personnel are adept at identifying infrastructure risks and maintenance or replacement solutions to address those risks. Given the continuous high volume of projects on NID Hydro's docket, project planning must be thorough, focused, and well-orchestrated. To address this need, in 2017, NID Hydro transitioned away from an ad hoc planning process and instituted a formal planning process that considers in input and risk assessment from maintenance and operations crews to support long-range project planning needs. NID Hydro refers to this as its Capital Improvement Plan.

The Capital Improvement Plan was implemented in an effort to proactively develop detailed and focused project plans. The process identifies the total life-cycle cost of each asset, and maps project schedules, staffing workload, and costs over the next 5 to 10 years. With this initiative, NID Hydro intends to increase the maturity of its project planning process so that projects are proactively identified and planned in detail. As part of the Capital Improvement Plan process, a review takes place at least annually prior to the annual NID Hydro budget season.

Electrical Documentation

Inadequate electrical system documentation remains a risk to NID Hydro’s ability to maintain and troubleshoot its infrastructure. This risk is a function of the infrastructure’s age, as few as-built drawings were retained many decades ago, and what was obtained is sometimes found to be inaccurate. In 2017, NID Hydro began taking steps to address this risk by hiring a contractor to review, validate, and update electrical documentation at the Bowman PH. In 2018, new electrical drawings were drafted for Chicago Park Powerhouse following the 2017 relay replacement and upgrade. This risk certainly deserves a continued focus and effort to further mitigate the downside for the remainder of NID Hydro’s portfolio.

Spare Parts

In prior years, interviewees identified the availability of spare parts as a potential threat to the reliability of the hydro operations. Many system parts have long lead times and are high dollar items. These same parts, if they fail, present single-contingency risks that could leave NID Hydro’s major equipment inoperable for long periods of time. This makes spare parts inventory management a difficult and expensive proposition. Hydro is constantly faced with evaluating the cost-benefit trade-off of stocking expensive, long lead time spare parts. In 2017, NID Hydro improved its risk profile in this area by purchasing redundant protection relays for Chicago Park Powerhouse, and a backup exciter for Chicago Park and Dutch Flat #2 Powerhouse. Still, interviewees noted that avoidable risks remain in this area, and NID Hydro should continue to closely monitor the health and downside risk of its spare parts inventory. For example, NID Hydro does not have backups for the Rollins protective relays, and should a device fail, the unit would be out-of-service until a replacement can be ordered and installed.

Spare Parts Inventory Decision Matrix	Lead Time	
	Short	Long
Inexpensive	Consider purchase	Purchase
Expensive	Do not purchase	Further analysis required

Table 4: Spare Parts Purchase Decision Matrix

Technology Changes: SCADA and CMMS Replacement

In 2017, NID Hydro and its vendor began a complete replacement of its SCADA system. Project completion is expected by the middle of 2019. When complete, this project will reduce NID’s technology and operations risk but getting to that point presents its own share of challenges. The first is making the switch-over to the new system, and the second is around security of the new system, which is discussed further in the Operating Environment-Cyber Security subsection below.

NID Hydro’s computerized maintenance management system (CMMS), identified as a risk in prior years, is inadequate for the needs of NID Hydro’s operations and maintenance requirements. Given the age of the infrastructure, extensive maintenance activities, and high project volume, NID Hydro should consider the purchase and installation of a more robust CMMS. The functionality required but missing from the current CMMS includes unlimited data collection capability, database structure that limits asset data

functionality, asset management tracking and reporting, full visibility of spare parts inventory, and purchase history, including vendor, date, and amount. In addition, NID Hydro lacks a formal warehouse, which presents another layer of difficulty for personnel to manage inventory and mitigate single-contingency events.

NID Hydro continues to evaluate potential upgrade solutions for its CMMS. The potential vendors have been narrowed down to three potential solutions. This replacement and upgrade has been budgeted in 2019. The upgrade of this system will be an important tool for documentation and record-keeping purposes, which has never been more important given the FERC and NERC regulatory environments.

NID Hydro Portfolio Growth

NID Hydro's footprint is expected to increase in late 2019 with the acquisition of the Deer Creek powerhouse from PG&E. The Deer Creek acquisition is a very strategic and critical project for NID Hydro. Owning this asset ensures NID Hydro remains in control of a critical conduit of its system's water supply. However, this acquisition will further stretch NID Hydro's existing resources and require NID Hydro to hire new positions.

In addition, NID is evaluating the possible construction of two new powerhouses. One at the Loma Rica Water Treatment Plant and one at the existing Rollins Dam. In a short time period, NID Hydro's portfolio could grow from 7 to 10 powerhouses. This growth will place new demands on all NID Hydro resources. Not only do more assets require additional regulatory compliance obligations (e.g., FERC, EIA, CPUC), it also requires additional obligations with the California Independent System Operator (CAISO). CAISO processes and requirements require attention and expertise, often within a short time period. This CAISO burden only increases with each additional generation resource with very little scalability across the portfolio.

Colfax Hydro Headquarters

Given the growing infrastructure footprint, the ever-increasing need to maintain the aging infrastructure and the heightened regulatory burden, NID Hydro's staffing needs are increasing. This has already manifested itself with the hiring of new positions in recent years and is likely to continue with the Deer Creek acquisition. The Colfax hydro headquarters is quickly running out of available space to house its growing workforce, tools, and equipment. In addition, NID Hydro lacks a formal and adequately-sized warehouse. In 2018, NID Hydro located and acquired a site for a future NID Hydro headquarters building. Plans are in the works for the design and construction of the new headquarters with planning and design likely to start in 2019.

Internal Risk Control System – The Continuous Process

Risk management is a mixture of art and science. NID Hydro is making a concerted effort to implement a variety of policy and procedure-level controls throughout the department. This is evident with the ICP and ROCC activities performed by NID Hydro personnel, enhanced CIP programming, as well as this annual risk assessment process. NID Hydro's proactive efforts to implement cyber security policies and controls over its new SCADA system is also evidence of a maturing internal control environment.

Recommendation and Conclusion

To mitigate the impact and minimize the likelihood of the inherent risks facing the NID Electric Division, the Division should continue to improve the maturity of its risk management program. Based on the risks identified in the table top exercise and summarized in this Risk Assessment, a summary of the recommendations for risk mitigation are shown in Table 5.

Category	Ongoing Risk Reduction Measures	Key Recent Activities and Updates
Electricity Market Landscape	<ul style="list-style-type: none"> ▪ Monitor and actively participate in PG&E bankruptcy proceedings. Identify potential changes to identified contractual strategies. ▪ Research and develop power market optimization options for NID’s small plants to transition to upon current contracts’ expiration ▪ Evaluate potential new technologies and/or strategies that allow more efficient operations in an evolving market and maximize hydropower’s positive impact to NID and the community ▪ Coordinate energy marketing strategies with NID sustainability policy efforts. 	<ul style="list-style-type: none"> ▪ Strategy for sales has been developed. Request for Information being developed to send to potential buyers. Results anticipated in June of 2019. ▪ Capital improvement projects to add necessary metering and telemetry are in progress. ▪ Alternative technologies such as battery storage, solar, pumped storage, net zero energy, and others under investigation and in coordination with sustainability policy.
People and Training	<ul style="list-style-type: none"> ▪ Support/promote external training opportunities for staff ▪ Research and develop an alternative hydro operations training program ▪ Continue research and development of a hydro maintenance training program ▪ Support the formal compensation review and recommended wage and benefit adjustments ▪ Coordinate asset management program needs with organizational structure and staffing needs. 	<ul style="list-style-type: none"> ▪ Most focus on external training has been centered around dam safety. A total of 4 Operations staff will have been formally trained in dam inspection by the Association of Dam Safety Officials by mid-2019. ▪ A market compensation survey is planned in the first quarter of 2019, which will be considered during Union MOU negotiations in 2020.
Regulatory Environment	<ul style="list-style-type: none"> ▪ Identify and plan for the increased regulatory and compliance burden. Areas include reliability, NERC/FERC, dam safety, and environmental compliance ▪ Replace the existing low level outlet valve at Rollins Dam ▪ Revise and update the CFR between NID and PG&E to appropriately allocate changing responsibilities 	<ul style="list-style-type: none"> ▪ The Board of Directors has approved a contract with Geo-Logic Associates for Dam Safety support as a temporary solution to staffing needs ▪ Hydro Compliance Analyst recruitment process is underway

	<ul style="list-style-type: none"> ▪ Scope, plan, and budget the FERC implementation compliance requirements. 	
<p>Operating Environment</p>	<ul style="list-style-type: none"> ▪ Pursue safety training consultant with considerable focus on hydroelectric operations ▪ Initiate identification of NID’s non-dam infrastructure at-risk of extreme weather and/or seismic activity damage and incorporate mitigations and/or repairs into maintenance plan ▪ Continue vegetation management efforts around NID facilities ▪ Evaluate adequacy of current resources dedicated to management of Hydro’s current and future IT and SCADA system ▪ Implement vegetation control adjacent to Infrastructure, where permitted, and continue navigating Federal permit processes for future vegetation control projects ▪ Develop operational model to include regulatory and customer system requirements with operational strategy to support potential future energy market pricing opportunities and time-of-day contract requirements 	<ul style="list-style-type: none"> ▪ RFP for safety consultant has been developed. Release anticipated by second quarter of 2019. ▪ Multiple contracts for vegetation management were issued in 2018. Additional contracts are planned for 2019.
<p>Infrastructure and Technology</p>	<ul style="list-style-type: none"> ▪ Capital Investment Program (CIP) – Continue to implement, evaluate and revise the CIP process to improve efficiency and effectiveness of major project execution ▪ Enhance asset management program risk assessment procedures to support project prioritization, planning, and budgeting. ▪ Implement the SCADA upgrade project and incorporate methods of physical and cyber security hardening ▪ Implement plans identified in the communication infrastructure study to provide improved, efficient and effective control and operations ▪ Install a fire suppression system in the Chicago Park Powerhouse 	<ul style="list-style-type: none"> ▪ Completed initial draft Capital Improvement plan. Identified software need and are actively pursuing a solution. ▪ SCADA upgrade completed for Chicago Park, Dutch Flat #2, and Rollins. Deer Creek and Scotts Flat are planned for 2019. ▪ Building needs study complete. Property for new Hydroelectric Department Headquarters purchased. Facility design RFP expected by mid-2019. ▪ Updates to Bowman Powerhouse drawings are nearly complete. Combie South Powerhouse in progress. Significant portions of Chicago Park Powerhouse were completed in 2018.

	<ul style="list-style-type: none"> ▪ Initiate a hydro headquarters expansion study to plan for growing staff numbers and need for additional space ▪ Commission the revision and/or validation of electrical system documentation (e.g. as-built drawings) and implement electrical document change policy ▪ Continue efforts to improve and maintain a healthy inventory of spare parts ▪ Continue efforts to commission and deploy a CMMS ▪ Continue effort to identify PGE Drum Spaulding system risk assessment and engage in efforts to improve infrastructure and supply reliability for NID. 	<ul style="list-style-type: none"> ▪ CMMS vendor identified. 2019 budget allocated for purchase of software.
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Table 5: Summary of Risks by Category

To mitigate the impact and minimize the likelihood of the inherent risks facing NID Hydro, the organization should continue with its efforts to improve the maturity of its risk management program. Disciplined and strategic organizations take proactive steps to identify and manage risk. For example, strategic organizations often begin with the single-contingency risks that have potentially devastating impacts on the organization and develop control measures to mitigate those risks. Fundamental to this is a documented management system that enables the organization to identify, control, and monitor its risk elements. To do so effectively requires a systematic approach to catalog risks and the associated internal controls that actively manage those risks. Ideally, these internal controls reside at all levels of the organization. They are deployed not only as control activities by front line managers and personnel, but also as management control measures to monitor, communicate, and assess risks throughout the organization. The culmination of these risk management practices results in an organization with a strong control environment originating with a strong “tone at the top.”

In accordance with the Nevada Irrigation District Internal Compliance Program, this 2017 Risk Assessment Report was commissioned by the Nevada Irrigation District Reliability Oversight Compliance Committee (ROCC), and its results shall be presented to the Nevada Irrigation District General Manager and Board of Directors.



 Greg Jones, ROCC Managing Director of Compliance



 Date