BEFORE THE
STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

In the Matter of

Orange and Rockland Utilities, Inc.

Case 14-E-0493

March 2015

Prepared Exhibits of:

Jason P. Pause
Power System Operations
Specialist 4
Office of Electric, Gas and Water

State of New York
Department of Public Service
Three Empire State Plaza
Albany, New York, 12223-1350

Relied upon O&R Responses to Information Requests

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Company Name: O and R Utilities, Inc.
Case Description: Orange and Rockland Electric and Gas Filing 2014
Case: 14-E-0493; 14-G-0494

Response to DPS Interrogatories – Set DPS-10
Date of Response: 12/22/2014
Responding Witness: Smart Grid Panel

Question No. : 261

Subject: Smart Grid –

1. Provide a detailed description and status report of the two smart grid circuits (West Nyack Project) installed in ORU's service territory and the five smart grid circuits installed in RECO's service territory. Include at a minimum the following:
    - A list of devices and/or equipment installed and associated costs
    - Any reports or results analysis associated with the project
    - A Cost Benefit Analysis
    - A schedule for entire project since inception to completion
    - Lesions learned from the project
    - Total cost

2. Provide all documentation (applications, reports, analysis, results, etc…) sent to NYSERDA associated with both the initial two smart grid circuits and the additional fourteen smart grid circuit's grants.

3. Provide a detailed discussion and explanation of how the Distribution Engineering Workstation (DEW) is used by the Company, along with all its capabilities and functions. Identify and/or state whether or not each function or capability is fully operational or still being tested. If still being tested, state when it will be fully operational. Additionally, identify which functions are used and related to the smart grid circuits projects.

4. Is ORU's Integrated System Model (ISM) fully functional at this time and capable of modeling ORU's entire service territory? If not, provide a detailed description of its existing capability and when the system will be completed and fully functional.

5. Provide the two following reports referenced in Exhibit SGP-E1 on page 2-1:

    - Methodological Approach for Estimating the Costs and Benefits of Smart Grid Demonstration Projects
    - EPRI's Guidebook for Cost Benefit Analysis of Smart Grid Demonstration Projects

6. Explain in detail how the following information and data was developed in Table 5-11 in Exhibit SGP-E1 on page 5-12.
    - Storm Restoration Costs ($/hr)
    - Number of Crews
    - Crew Hours Saved per Storm

7. Provide a historical breakdown and description of the projects associated with the Smart Grid Resiliency Blankets and costs since inception.

8. Provide historical personnel levels going back 10 years for the departments listed below. Additionally, include titles and job description for each different position in the department.

    - Engineering Design and System Development
    - Electric System Operations
    - Electric Operations

9. How many CAAD employees are on duty at a time throughout the 24/7 shift schedule?

10. On page9, line 5&6 in testimony, it states that on average the CAAD has 17 hours of work for each 12 hour day. Is that based on the existing staffing levels? If so, what will it be with the three new CAAD positions?

Response

1. A detailed description and status report of the West Nyack Smart Project that established two smart grid circuits, is provided in attachment DPS10-261 Att-1, which documents the status as of September 30, 2014. There has been no change in the status of this project since this time. The equipment installed is detailed in the document. Installed cost by device is not kept, however, costs have been segregated into Communications Costs, Substation costs, and Distribution Costs. The breakdown of the total cost of the West Nyack Project by these categories is as follows:
   Communications: $1,487,000
   Substation: $ 701,000
   Distribution: $1,694,000-$152,000 in outstanding NYSERDA reimbursements = $1,542,000
   Total Cost: $3,730,000

   A comprehensive schedule was not prepared or maintained on an ongoing basis and therefore is not available.

   Rockland Electric Company ("RECO") performed the following work to implement the DOE funded SGIG pilot program in its New Jersey service area:

- Constructed a high speed cyber-secure, diverse, backbone communication system to provide adequate and reliable data communications.
- Upgraded the South Mahwah and Darlington substations to enable substation automation, added state of the art equipment for condition monitoring, provided enhanced operational data collection and installed high speed data communications.
- At the Darlington and South Mahwah Substations, upgraded the distribution circuitry and modified the topology to enable enhanced automation thereby allowing for establishing a system of five energy efficient, reliable, self-healing circuits. RECO installed switched shunt capacitor banks to improve efficiency, line reclosers to improve reliability, and Supervisory Control and Data Acquisition ("SCADA") operable switches to enable self-healing. In addition, RECO installed three phase sensors to provide information to electronic power quality nodes for enhanced monitoring of the electrical condition of the distribution system. All of the above mentioned equipment was equipped with two way communications.

Communications component of the SGIG pilot program

RECO performed the following work to provide the secure, reliable and diverse communications required by the SGIG pilot program.

- RECO established a core fiber infrastructure for data backhaul from two major communications hub sites located at the South Mahwah and Darlington substations. This will allow data to be brought back from the RECO service territory to Orange and Rockland's primary energy control center ("ECC") in Spring Valley, New York and to Orange and Rockland's alternate ECC in Blooming Grove, New York. This high capacity fiber loop network was constructed with diverse paths and redundant components, thereby reducing exposure to a single point of failure. As such, it provides alternate pathways in the event of a fiber cable break in any part of the fiber loop network, and redundant electronic equipment protects against loss of communications from electronic equipment failure. RECO also employed this routing and equipment redundancy scheme internal to each hub site, in order to provide a high level of system availability and reliability.
- RECO installed Dense Wavelength Division Multiplexing ("DWDM") technology to provide high-capacity connectivity among all hub and ECC sites. This arrangement provides ample data capacity for RECO's present and foreseeable future backhaul requirements.
- RECO established communication with its intelligent field devices external to the substations over licensed radio frequency spectrum in the 220MHz band. This was determined to be a reliable radio solution by radio frequency ("RF") propagation studies which were conducted throughout the RECO service territory. The RF study demonstrated good signal strength was achievable, but that the signal strength in the southernmost area of the RECO service territory was weak and unreliable. This unreliability necessitated the addition of another master radio site in order to provide reliable communications to all

smart field devices. Based on the RF study, the Company purchased spectrum licenses after field test verification of the study results.

- The Company owns and operates a radio communications site in Mahwah, New Jersey that is used for voice communications between vehicles and the Company's ECC, as well as providing communications paths for corporate data systems. The Company used this site to establish communication with the majority of the field devices, installed pursuant to the SGIG pilot program. Studies were conducted to determine the optimal location for an additional master radio site. After extensive evaluation, the Company determined that establishing the second radio site on existing RECO-owned property in Wyckoff, New Jersey would best accommodate RECO's communication needs. The radio equipment and antenna have been installed at this location and the site is currently on the air.
- RECO maintained cyber security compliance throughout the network design by installing firewalls necessary for meeting newly established corporate standards. RECO also addressed the physical security of the critical components by installing dedicated cabinets with secured locks for use by only authorized personnel. This equipment is segregated from other RECO-based communication assets.

There was adequate space available for the addition of secure electronic cabinets within existing structures at all locations, except at the Darlington Substation which required the addition of a new communications shelter to house the required fiber optic equipment. RECO placed a pre-cast building on site after receiving the required approvals from the Town of Ramsey. RECO established redundant and diverse fiber links between this pre-cast building, the control house, South Mahwah substation and the ECCs.

South Mahwah Substation Upgrade portion of the SGIG pilot program.
The South Mahwah Substation is a 345kV to 138kV to 69kV substation that is located at the interconnection of the NYISO and PJM Regional Transmission Organizations. This station is also a source for local 13.2kV distribution circuitry. Due to the importance of this substation to RECO's electric distribution system, introducing smart grid technology at South Mahwah positions both this substation and RECO for the move to faster, more secure real time data driven, analysis, decision making and intelligent automated control. These advancements will have a positive effect on both the efficiency and reliability of RECO's distribution system.

As part of the SGIG pilot program, RECO increased the existing 35MVA 13.2kV substation transformer bank at the South Mahwah Substation to a 50MVA bank, and added a second 50MVA bank, and a 138kV underground transmission connection to the 138kV bus within the Substation. These improvements will provide the capacity and redundancy necessary to enable RECO's Smart Grid design methodology and improve reliability. Reliability was enhanced further through the addition of a Smart Automatic transfer scheme that transfers load to the adjacent transformer bank at the South Mahwah Substation upon loss of a

bank or bus. The infrastructure benefits are immediate in that capacity at the Substation has been significantly improved and circuit count has increased from four to ten. The redundant banks and main buses provide backup capability not previously available.

The transformers are equipped with condition monitoring equipment to permit real time monitoring of critical condition indicators such as transformer winding hot spots, oil temperatures, tap position, and load tap changer ("LTC") motor current. This advanced monitoring of equipment in real time allows for dynamic ratings to be achieved through the analysis of real time operating temperatures. Real time ratings allow for true operation of the equipment ratings per the ambient temperature versus the restriction of only operating by static summer/ winter ratings.

In addition to the substation transformer replacement and new transformer bank addition, RECO implemented several other infrastructure upgrades to accommodate the conversion of South Mahwah to a Smart Grid enabled substation. This includes the installation of state of the art distribution switchgear and ten underground distribution circuit exits. The new switchgear provides new circuit positions to allow for load relief and new circuit breakers for the existing circuits. The switchgear was equipped with smart micro-processor based protective relaying for the substation transformer banks and the distribution circuits. The relays are time synchronized via a Global Positioning System ("GPS") clock, which provides for better diagnostics and more accurate analysis of events and disturbances.

In addition, RECO introduced a time synchronized relay-based breaker monitoring system to identify breaker timing issues and wear. This real time intelligent diagnostic equipment better identifies incipient faults in the units, thereby protecting equipment from failure and enabling replacement of time-based maintenance schedules with condition-based maintenance schedules. All of this should lead to reduced maintenance costs.

RECO also introduced a Substation Enterprise Server which allows secure remote access to the Intelligent Electronic Devices ("IEDs") within the substation. Access to this data allows RECO to perform post-event analysis of incidents prior to dispatching crews to the substation. The Enterprise Server is designed as a North American Reliability Council ("NERC") / Critical Infrastructure Protection ("CIP") compliant solution for advanced user authentication and data encryption. The system automatically creates and manages remote connections, tracks all user activity, proactively prevents unauthorized connection attempts to restricted devices, and provides a centralized collection point for IEDs such as relays and meters. The Enterprise Server also logs critical power system data that feeds into the SCADA system and the distribution analysis and control systems. Additionally, the information will assist in system planning and restoration needs.

Implementing the SGIG pilot program at the South Mahwah Substation required RECO to establish advanced communications abilities through use of fiber-optic connections to increase bandwidth, improve polling speed and transfer information from the existing Remote Terminal Unit ("RTU") to the ECC. The increased bandwidth of the fiber optic communications allows RECO to retrieve more information remotely for analysis. In addition, these dedicated fiber optic lines improve communication reliability, performance, and enhance cyber security.

Darlington Substation Upgrade portion of the SGIG pilot program
When RECO constructed the Darlington Substation in 2004, it equipped the Substation with many state of the art IEDs. As part of the SGIG pilot program, RECO implemented the additional modifications, described below, at the Darlington Substation.

- Installed a fiber-optic connection to the Substation thereby increasing and improving the polling speed and transfer of information from the existing RTU to the ECC.
- Installed a new data connection to the Substation via fiber-optic communications for connection to the Company's Enterprise Server. As noted above in the discussion of the South Mahwah Substation upgrade, the Enterprise Server connection allows secure remote access to the devices in the Substation for transfer of data and fault files, thereby allowing for engineering planning analysis and post-event analysis of incidents prior to dispatching crews to the Substation. The Enterprise Server is designed as a NERC/CIP compliant solution for advanced user authentication and data encryption.
- Installed a new Substation Server in order to provide advanced substation functionality, including:
    - Centralized collection point for IEDs such as relays and meters;
    - Data log critical power system quantities used for SCADA, real time control, planning and restoration needs;
    - Automatic fault retrieval and file transfer to the ECC; and
    - Authenticated secure device access.
- Time Synchronization of all protection relays to allow for the time stamping coordination of data from the individual devices within the Substation allowing for more accurate analysis of events and disturbances.
- Upgrade to a Smart Annunciator for increased alarm capability and better decision making by the ECC System Operators. Identifying the actual alarm, instead of an alarm category, as is currently provided, will facilitate improved system decisions and resource deployment.
- Connect Transformer and Breaker Diagnostic equipment to the Substation Server for remote interrogation and routine exception reporting in order to increase and improve the reliability of the major components in the Substation. This will help identify incipient faults in the units, better protect equipment from failure, and reduce adverse impacts to customers from service interruptions. Benefits also include the advanced monitoring of equipment in real time which allows for dynamic ratings achieved through the analysis of

real time operating temperatures. The intent is for the time-based maintenance schedule currently in place to be modified with a condition-based maintenance schedule.

Distribution Circuitry upgrades that RECO implemented as part of the SGIG pilot program.

RECO modified the circuitry of the Darlington Substation as follows in order to create a system of the five smart grid circuits:

- Upgraded approximately 990 feet of single phase overhead distribution to three phase and extended the three phase 180 feet to create an overhead mainline circuit tie; and
- To provide load relief to the existing circuitry, re-conductor 1,170 feet of single phase to three phase main line circuitry thereby allowing the system to be reconfigured to create tie between two of the Darlington circuits.

RECO installed a total of 3,185 feet of three phase double circuit overhead mainline conductor to create the necessary circuit paths for additional circuits originating from the South Mahwah Substation. The upgrade to the South Mahwah Substation included additional 13.2kV breaker positions that allowed two new distribution circuits to be installed which were used to relieve the load on existing circuitry.

One of the South Mahwah 13.2kV circuits serves heavy commercial load on Route 17 and the residential and light commercial load in the Stag Hill Road area. This circuit exceeded its Relief Rating and was quickly approaching its Emergency Rating. The existing ability to transfer load to adjacent circuitry was limited, so reducing the load by transfer to a more lightly loaded circuit was not possible. In order to relieve the loading on this circuit and provide additional distribution circuitry with available capacity to operate within acceptable limits and as part of a smart grid auto-loop design, RECO needed to install two new circuits out of the South Mahwah Substation. These new circuits exit north out of the South Mahwah Substation as underground construction and rise to overhead construction on Airmont Road. Approximately 1,330 feet of electric distribution facilities on Airmont Road, between Island Road and Franklin Turnpike, was rebuilt for a double circuit pole line to accommodate the two new circuits. To accomplish the required distribution circuit reconfigurations, it was necessary to tie the new circuits into the existing circuitry by constructing 1,855 feet of double circuit main line distribution circuitry along Route 17.

Distribution Automation and Smart Grid equipment on the system of five smart grid circuits as part of the SGIG pilot program.

RECO installed 23 reclosers on five distribution circuits to develop a smart system of circuits. All reclosers are equipped with radio communications between the recloser and a master radio tower site. Each recloser is also equipped with a smart RTU to provide remote control via the company's Distribution Supervisory Control and Data Acquisition System ("DSCADA"). Fifteen of the 23 reclosers will be used as conventional reclosers in an auto loop configuration for fault clearing and circuit tie operation. These reclosers have two way communications

and are available for control by the Distribution Operators and the Auto Restoration Control System. The remaining reclosers are being used as SCADA operable switches and are available for use by the Distribution Operators and the Auto Restoration Control System. In addition, 11 switched capacitor banks equipped with radio communications, RTUs and smart controls are in service and available to the operators for situational awareness and for control. These devices can operate automatically, can be operator controlled or can be controlled by the centralized Coordinated Volt / Volt-Ampere Reactive ("VAR") system. Additionally, RECO installed three phase sensors on these installations to provide power quality information which is available in real time to the operators via DSCADA.

Real time control systems developed by RECO as part of the DOE SGIG pilot program

The auto restoration system has been developed and the model centric software used by this control system has been tested and deemed to be working correctly and reliably. Pole mounted electronic controls that operate the field hardware have been set up in the Smart Grid Lab to test the production versions of the control system using the production DSCADA system and actual communications paths.

RECO simulated distribution line faults on this test system and the model centric software successfully determined the proper means of isolating the fault and restoring the customers on the un-faulted line sections. The control system then successfully executed the isolation and restoration plan through the DSCADA system. Control commands were received by the hardware which operated successfully to clear the simulated fault and restore the un-faulted line sections. The DSCADA system itself is undergoing some final design upgrades, functionality improvements, and software upgrades. RECO is in the process of rigorously testing the DSCADA improvements. An interface into the switching module of the Company's GIS mapping system still needs to be developed to allow the real time control system to receive manual switching updates in near real time so the circuit topology of the model remains in sync with the actual system. Completing this testing, the necessary operator training and development of this interface will allow RECO to place the auto restoration control system into service.

The model centric Volt / VAR control system was also tested in RECO's Smart Grid Lab using production systems and actual field hardware. The system worked as designed to control the voltage levels and provide VAR support to maximize efficiency by minimizing system losses. The testing demonstrated that the software successfully reduces voltage levels for conservation voltage reduction without generating customer voltage violations. The testing also revealed that additional savings could be realized by revising the software algorithm to improve system efficiency when in conservation voltage reduction mode. RECO worked with the vendor to integrate this change into the software. The revised Volt /

VAR system software has been received and will be rigorously tested and then placed into service upon completion of the testing, operator training and the interface described above.

Benefits RECO realized from the reclosers installed as part of the SGIG pilot program

RECO's customers are benefitting from these installations even though the Auto Restoration Control System is not yet in service. Upon completion of the installation, RECO placed some reclosers in service in a conventional automatic fault clearing mode to improve reliability and placed the remaining reclosers in service as DSCADA operable switches. With all reclosers communicating with the DSCADA system, the Company's Distribution System operators now have enhanced situational awareness and remote control. This allows the operator to quickly make informed decisions and build restoration plans that they can be executed remotely. This improves customer reliability and reduces system restoration time. Once the Auto Restoration control system is placed in service, it will automatically build and execute restoration plans relieving the operator of that task. This ability will further improve and expedite fault isolation and restoration, thus improving reliability and resiliency above the levels that can be achieved under direct operator control. This will provide a major benefit, particularly during storm conditions when the operator is inundated with information and is dealing with numerous system events

Benefits from the distribution capacitors installed as part of the DOE SGIG pilot program

Prior to installing the smart grid switched capacitors, RECO performed an analysis to determine the phase swaps necessary to phase balance the circuits and phase changes were performed in the field. Additionally, RECO performed analysis to optimize capacitor location and size. Fixed capacitor banks, and switched capacitor banks of the proper size equipped with Smart Grid controls and communications were installed at the locations identified in the analysis. All switched capacitor banks were placed in service with conventional system peak based automatic control settings and are ready for coordinated Volt / VAR control. Optimizing the circuits by performing phase balancing and optimally sizing and placing the capacitor banks lowers system losses and improves system operating conditions. The coordinated Volt / VAR control once placed in service takes this to a new level by dynamically adjusting voltage profiles and VAR support across the entire year, while also reducing energy consumption through conservation voltage reduction.

Cost benefit analysis applicable to the DOE SGIG pilot program

Orange and Rockland has worked collaboratively with Brookhaven National Labs ("BNL"), Electrical Distribution Design ("EDD") (a consultant based in Blacksburg Virginia), and has contracted with the Electric Power Research Institute ("EPRI"), through Con Edison, to identify and quantify tangible cost savings that can be realized from the Smart Grid concept used in the SGIG pilot

program. Orange and Rockland, BNL and EDD have collectively identified some areas where tangible cost savings could be realized. Using Orange and Rockland's DEW engineering software and its Integrated System Model ("ISM"), Orange and Rockland and BNL performed detailed calculations on a system of fourteen typical distribution circuits to determine improvements in circuit efficiency that can be achieved through phase balancing and optimal capacitor sizing and placement. Using these optimized circuits, EDD then performed calculations to determine the incremental improvement in efficiency that adding a real time Coordinated Volt / VAR control system to these circuits, as was done in the SGIG pilot program, could potentially provide. EDD also performed a Conservation Voltage Reduction ("CVR") analysis on these circuits to determine what energy savings could potentially be achieved through the use of the Coordinated Volt / VAR system in CVR mode. Additionally, Orange and Rockland prepared an analysis of the effects that adding automation could have on the deferral of a major capital project. Also analyzed were the effects that automation can potentially have on storm resiliency. EPRI prepared a report that identified the savings from these areas. The report provides a qualitative measure to the value of the various methodologies and technologies used, and monetizes some of the potential tangible cost savings that can be achieved on this 14 circuit system. While all of the modeling and analysis was performed on circuits in Orange and Rockland's service territory, the circuits are representative of the electric distribution system that exists in RECO's service territory. As a result, the benefits identified from these various methodologies and technologies are applicable.

Costs

The cost breakdown for each portion of this project is detailed in attachment DPS10-261 Att-2.

Lessons Learned

The lessons learned for both the NY Smart Grid pilot project and the NJ DOE funded SGIG project are as follows:

- In general, commercial SCADA systems are designed to be used by System Operators and require software modification and secure communications protocols to execute control system commands that will remotely operate a field device machine to machine. Additionally, to insure line worker protection, the safe operation of systems under model centric control requires that safeguards be added to commercial SCADA systems and rigorously tested.
- Manufacturer's documentation of how their field device electronic controls will function in conjunction with real time control systems is inadequate. Extensive functional testing is required to insure reliable operation.
- Communications bottlenecks result when system events trigger field devices to report in via SCADA to the model centric control system. Prioritization of reporting devices and suppression of unnecessary data being reported back by

the field device is imperative to insure fast reliable and robust communications during system events.

- Simplified system event recorders as used in many line reclosers have proven to be inaccurate. Oscillography from power quality nodes has proved to be much more accurate.
- The overall cost of smart grid implementation can be reduced by using Motor Operated Air Break Switches ("MOABS") between fault clearing devices instead of line reclosers in switch mode.
- Standardization is necessary to reduce the different number and types of electronic controls, and, the software necessary to program each type. This is needed to simplify field operations and maintenance.

Modifications to IEEE and NEMA standards for Line Reclosers are necessary. The standards need to mimic those of substation circuit breakers where the circuit breaker and relay are separate and any manufacturers relay can work with any manufacturer's circuit breaker. Unfortunately line recloser standards are not set up this way and most recloser manufacturers sell an integrated package that is not interchangeable. This weds the utility to the vendor because unless only the very simple basic functions of the controls are used, mixing recloser packages by different vendors on the same circuit where smart grid operation is being provided is problematic.

2. Attachments DPS10-261 Att-3 through DPS10-261 Att-13 contain all of the information sent to NYSERDA regarding the initial two smart grid circuits grant and the additional 14 circuit smart grid grant.

3. The Distribution Engineering Workstation ("DEW") is an open architecture suite of applications that is the backbone of our distribution engineering analysis system and our real time control systems. The list of applications is given below.

DEW Model Building Applications

- Build Circuits Application – This application creates the Integrated System Model ("ISM") by downloading all of the distribution system components from the company's GIS distribution mapping system, component at a time, to create a model with accurate electrical connectivity that can be used for electrical analysis. This application also aggregates KWHr usage data provided from the Customer Information Management System ("CIMS"), by month and by rate class for each distribution transformer in the system and attaches the load to the model. The ISM is stored on a server and cannot be modified by a user. The model's topology is updated directly from the mapping system each time the Build Circuit Application is run. This application is fully functional and is used by the DEW system administrator
- Load attachment Application - Loads are updated monthly from automatic monthly load extracts from CIMS by running a script to place the data into the DEW format and read it into the DEW database on the server .The load attachment application is then run to update the load in the model insuring that the most recent 12 monthly loads for each transformer are available to the user. This application is fully functional and is used by the DEW System Administrator

- Circuit Server Application – This application allows the users to download the:
    - Entire ISM;
    - An individual circuit; and
    - Any system of circuits in any combination.

The users then store the download to a file on their C: drives or anywhere else they desire. The users can modify the circuit any way they like allowing them to do what if scenarios for planning and analysis. This application is fully functional and is used by all DEW users.

Engineering Analysis Applications

- Component Immittance – This application determines the impedances and admittances of all of the components in the model it is needed to run the power flow application and will be invoked automatically if not selected when power flow is run. This application is fully functional and is used by all DEW users and is related to the smart grid circuits
- Load estimation – This application applies load research statistics and a load profile to the KWHr loads for each rate class attached to each transformer in the model and calculates the hourly demand and diversifies it providing a diversified hourly load for each transformer. This application will be invoked automatically if not selected when power flow is run. This application is fully functional and is used by all DEW users and is related to the smart grid circuits.
- Power Flow Analysis – This application performs a power flow analysis on the model and is capable of analyzing models with radial, closed loop and network topologies all of which can be in the same model. This analysis is fully functional and is used by all DEW users and is related to the smart grid circuits
- Transformer Load Management – This application analyzes transformer loading and load duration for each transformer in the model to help determine which transformers are overloaded and should be upgraded. The application is fully functional and is available to all users. This is not necessary for the smart grid circuits
- Distributed Energy Resource Assessment – This application determines if the Distributed Energy Resource can be adopted by the circuit without causing electrical problems. This application is available for all DEW users. It is not related to the smart grid circuits
- Distributed Energy Resource Impact. - This application looks at the impact that a distributed energy resource can have on the system such as capacitor and regulator bank hunting, creating high voltage conditions etc. This application is available to all DEW users. It is not necessary for the smart grid circuits.
- Feeder Performance – This application determines for each circuit within the model, total energy usage, total losses, losses by phase, circuit efficiency, total cost losses, total cost of losses by phase. This application is fully functional and is used by all DEW users.
- Flicker analysis - This application will determine flicker for a motor load placed at a specific location on the system. This application is fully functional and is used by all DEW users
- Capacitor Design – This application allows the user to optimize size and placement of capacitors to minimize system losses while maintaining adequate

voltage levels. It also provides on and off voltages for switched capacitor banks so control settings can be easily determined. This application is fully functional and is used by all DEW users. This application is usually used in conjunction with the Feeder Performance application to determine savings in losses.

- Phase Balancing – This application determines phase moves to optimize phase balance on the feeder. It provides the loss reduction each move will achieve. This application is also used in conjunction with Feeder Performance to identify loss savings
- Reconfiguration for Restoration – This application allows the user to place a fault on the system at any location in the model at any time of day. It determines which protective device will clear the fault, the best way to isolate the fault and restore customers in out of service un-faulted line sections. This application is fully functional and available to all DEW users, but is primarily a tool for the Distribution System Operators. DEW has not been introduced to the Distribution System Operators at this time. It will be when the Real time control systems are introduced

Real Time Systems

- Virtual SCADA – The ISM is connected to the Transmission/Substation SCADA system and receives real time data from the substation feeder breakers. It is also connected to the Distribution SCADA system and receives real time data from the Distribution automation devices in the field. The real time data is attached to the model and used to scale the loads that were derived using the load research statistics providing results that more accurately represent actual real time values. Essentially a real time state estimator. A new power flow is run each time a real time load changes. The results of the power flow are ported out in real time to the GIS mapping system viewer so anyone with access rights to the viewer can display the calculated electrical parameters for any electrical asset in the system. This system has been prototyped and a real time interfaces to the production Transmission/Substation SCADA system into the production Distribution SCADA systems have been established. The interface into the GIS mapping system was built and was working in a prototype environment. What remains is to integrate this into the production system.
- Auto Restoration - This application is detailed in attachment DPS10-261 Att-14, which was submitted to the DOE as part Con Edison's ARRA Smart Grid Demonstration grant. This report along with the attached document entitled "ORU ISM Design Documentation" details the design, software development and the software testing of the Auto Restoration Control System and the Volt Var Control System. Neither of these systems is in service in a production mode. The Auto Restoration System has been lab tested to verify proper operation as a fully integrated system. A system interface to the switching module to the GIS mapping system needs to be developed so that topological changes resulting from manual switching can be placed into the real time Auto Restoration and Volt Var Control system model in near real time to keep the model up to date and insure proper operation of the control system in the production environment. This application is part of the smart grid circuits

- Volt Var Control – Please see the response to Auto Restoration above. The revised algorithm and application for the Volt Var control system has been software tested but needs to be lab tested as a fully integrated prototype system before it can be placed in service on a production environment. This application is part of the smart grid circuits.
- Real Time Control Simulator – The real time control simulator was designed to allow functional testing of the DEW control systems. This is the system used to test the prototype systems in a fully integrated environment. It is fully functional and is used by the DEW system administrators. Once the DEW control systems have been fully tested, accepted, and placed in a production environment, this simulator will be repurposed to provide a training simulator for Engineering, Operations and the Distribution System Operators.

4. Yes, the Integrated System Model (ISM) is fully functional and contains all primary voltage electrical assets to the secondary bushings of the distribution transformers. There are currently 366,764 assets in the model and over 1 million nodes. A mixed system of radial and closed loop lines exist in the model and power flow can be run on the entire system in a single run that will solve in less than two minutes on a laptop computer.

   The Company's transmission system has also been modeled and is in the process of being included in the ISM so a combined Transmission and Distribution power flow can be run in DEW on the entire model. At this time the combined Transmission and Distribution power flow has not yet been implemented.

5. Please see attachments DPS10-261 Att-15 and DPS10-261 Att-16.

6. *Storm Restoration Costs*

   The Company keeps track of the total cost of each storm and the Outage Management System has the date and time a storm began and when it was completed. The Storm Restoration Cost is simply the cost of the storm divided by the number of hours the Company was in storm mode. It is recognized that this is a general value. The table referred to is intended to show the magnitude of the potential savings not absolute value of the savings.

   Number of Crews

   The number of crews is based on subject matter expert opinion of the number of crews historically needed for each type of storm.

   Crew Hours Saved Per Storm

   A 14 circuit model was downloaded from the DEW ISM using the Circuit Server Application. This 14 circuit model represents the same 14 circuits the Company is expanding its Smart Grid concept across and has received a grant from NYSERDA for. The model includes all of the manual switching devices and any reclosers that existed in the field at the time it was downloaded. It should be noted that at the time

this model was prepared the work on expanding the smart grid concept had not yet begun and the number of existing line reclosers was minimal. The switches in the model were essentially all manually operated switches. The same model was copied and the model modified to represent the automated switching planned for the smart grid expansion on the NYSERDA grant.

A Monte Carlo simulation was run on both models, randomly failing components based on the hourly outage statistics of the storm type being simulated.

Each time a component is failed the DEW reconfiguration for restoration application was run and a switching solution was determined based on restoring the maximum number of customers.

In the manually switched model manual switches and any line reclosers that may have operated were switched. In the automated model only automation devices were operated.

The system iterates through each hour of the storm, randomly failing components based on the storm outage statistics. It then repeats the simulation process treating each new run as a new storm until the Monte Carlo simulation converges. Thousands of simulations were run for each storm type for both the manual switched model and the automatic switched model.

During this analysis the switching time for automatic switching takes zero time. Manual switching is uses 1 hour for the first switch operation and 15 minutes for every other switch operation in that run. The total switching time is what the Monte Carlo simulation converges on.

The total manual switching hours per storm as determined from the Monte Carlo simulation, divided by the number of crews working the storm provides the number of crew hours saved per storm.

7. The Smart Grid Resiliency Blanket is a new blanket for 2015. In 2015 and 2016 the money in this blanket is being used to fund the 14 circuit smart grid expansion that the Company received a NYSERDA grant for. In 2017 the money will be used to continue the smart grid expansion.

8. Please see attachments DPS10-261 Att-17 through DPS10-261 Att-26.

9. By January 1, 2015, the Company will have all three of the CAAD positions requested already hired into the Company. These three additional positions will allow us to adopt a new schedule in which we will have up to two operational and one notification CAAD on shift during the day and one operational CAAD on overnight.

10. The average amount of work per day described in the Smart Grid Panel's testimony is based on existing staffing levels. The addition of the new CAAD positions will primarily separate the administrative/notification responsibilities of the CAAD and the operational/safety responsibilities of the CAAD. The new split during the day

will be estimated at 14 hours for the operational CAAD and ten hours for the notification CAAD. The new splits include shared responsibility for some key responsibilities like emergency response and OSHA coordination that both CAADs will be responsible for during normal operations and emergency events. On the overnight, because the notification CAAD will not be on shift, all 17 hours of responsibility revert back to the operational CAAD on duty.

Company Name: O and R Utilities, Inc.
Case Description: Orange and Rockland Electric and Gas Filing 2014
Case: 14-E-0493; 14-G-0494

Response to DPS Interrogatories – Set DPS-30
Date of Response: 02/09/2015
Responding Witness: Smart Grid Panel

Question No. : 451

Subject: Smart Grid

1. The Central Rockland Smart Grid project has an estimated cost of $7.3 million. NYSERDA funding is $2 million for the project. That leaves a total of $5.3 million remaining. The Smart Grid panel stated that the Company has $3.5 million of funding already budgeted for the project. Provide a detailed description and breakdown of the $3.5 million identified in the testimony.

2. Provide a map identifying where the Central Rockland Smart Grid project and associated substations/circuits are located. Also identify where the Central Rockland substation would be located, if known at this time.

3. Provide an explanation for why the Smart Grid expansion project was proposed in the Central Rockland area both instead of and before the Pomona area.

4. In response to IR DPS-261, there were documents provided to NYSERDA that stated that reductions associated with the smart grid expect to result in reductions in O&M expenses. Provide an explanation for any reductions in O&M expenses that are expected as a result of this project. Provide a cost breakdown of the expected O&M expenses. How were the reductions figured into the overall cost benefit analysis performed? Explain why any projected O&M savings should not be used to offset the additional smart grid related labor and additional positions proposed in Company's testimony.

5. Provide the annual 10 year historic staffing levels and a detailed job description for each of the following jobs.

    - Technology Engineers in the Technology and Automation Engineering Department
    - Control Authorities for All Distribution (CAAD) in the System Operations Department
    - Distribution Equipment Technician in the Electric Operations Department
    - Equipment Technician Supervisor in the Electric Operations Department

6. Provide a detailed organization chart for the electric operations, system operations, and engineering department.

7. If all 10 of the smart grid related positions were put in place by the Company and the full 18 year roll-out of the smart grid implementation plan proceeded as planned, how long before any additional smart grid related positions would be needed?

8. In testimony and in the EPRI report, a 25 year net present value cost savings of $7.4 million is identified for the deferral of the Central Rockland substation due to the smart grid initiative as well as $7.5 million in storm response savings over a 10 year period. Provide an explanation as to why the 25 year and 10 year timeframes for the savings were selected for each subject. Are there any benefits to a longer or shorter timeframe for savings analysis?

Response

1) This project includes the installation of 14 reclosers, 18 controlled capacitor banks, 14 fixed capacitor banks and 34 motor operated air break switches on 14 distribution circuits in the Central Rockland County, NY area. The scope includes all engineering, estimating, material procurement, construction and SCADA commissioning for each device location. All reclosers, switches and controlled capacitor banks will have SCADA capability and shall be operator controlled with the reclosers providing auto-loops for automatic isolation and restoration. The table below sets forth the budgeted allocations for each cost area.

Cost Type	Allocation	
Material	$	4,455,000
Engineering Labor	$	1,155,000
Communications	$	60,000
Grand Total:	$	5,670,000
NYSERDA CREDIT	$	2,000,000
Total:	**$**	**3,670,000**

2) See attachment DPS30-451 Att-1.

3) The Company's distribution planners study the distribution system to determine when and where upgrades are needed, such as new transformers, new substations, or new distribution lines. Reliability performance commonly declines (i.e., customer-hours of interruption increases) as more customers and devices are added to feeders over time and the load grows. Future upgrades are needed to prevent reliability performance from dropping below distribution planning criteria which support

regulatory mandated system reliability criteria. The Company has determined that Central Rockland was in violation of the Company's planning criteria commencing in 2019. Pomona was violating the Company's planning criteria commencing in 2021. As discussed below, Smart Grid Expansion alone would resolve the Central Rockland violation, but would not resolve the Pomona violation.

1. Distribution Design Standards of 60,000 customer hours of interruption for a failure of either substation bank at the Burns station will be exceeded in 2019 due to the load growth in the Central Rockland area. Installation of the Smart Grid equipment will reduce the customer hours of interruption to 32,000 in 2019 by utilizing the automated equipment and eliminating manual switching. The Smart Grid Automation Plan allows planners to defer the planned substation upgrade from 2021 to 2029.
2. The Pomona area is served by multiple heavily-loaded and long circuits from several stations (i.e., Stony Point, West Haverstraw, Tallman, and New Hempstead). The Pomona area has been challenged to serve load and maintain adequate voltage at peak times. Upgrading New Hempstead to larger banks (with Load Tap Changers) and two additional circuits deferred the expensive Pomona Station for several years. By 2021, there are three locations where a simple circuit contingency will still be difficult to provide 100% backup. The next step would be the construction of the Pomona Station to provide relief and backup for these long and heavily-loaded circuits.
3. Reducing the load in this area (e.g., by Demand Side Management, Energy Efficiency, Distributed Generation) will allow the area to maintain 100% backup for these contingencies and defer the construction of the Pomona Substation. Installing Smart Grid Automation only to improve restoration would not solve the problem in the Pomona area because the problem involves the lack of backup capacity.

4) The benefit of reduced O&M expenses outlined in the pilot project are calculated based upon adding condition monitoring to critical substation equipment, integrating it with data from other Intelligent Electronic Devices ("IEDs") within the station, and making this data available across the Company in a cyber-secure fashion through state of the art sophisticated computer applications. The reduction in O&M expenses is attributed to saving expenses incurred by performing maintenance on high cost substation equipment prior to failure. Maintenance cycles that are currently scheduled are based upon time cycles. Moving to a monitoring based program will theoretically save O&M expenses incurred from outages that would have occurred and expenses associated with repairing that asset at an overtime after-hours rate. The savings can't be used to offset other costs due to the pilot nature of the project. The Company has not quantified the O&M related savings to a specific dollar amount. The Company should be in a better position to forecast such O&M savings after the completion of the pilot project.

Year	Technology Engineers	CAAD	Distribution Equipment Technicians	Equipment Technician Supervisors
2005	0	20	Job titles were created in 2010.	
2006	0	19		
2007	0	19		
2008	4	18		
2009	4	18		
2010	8	18	4	1
2011	9	18	4	1
2012	9	18	4	1
2013	8	17	3	1
2014	8	18	2	1

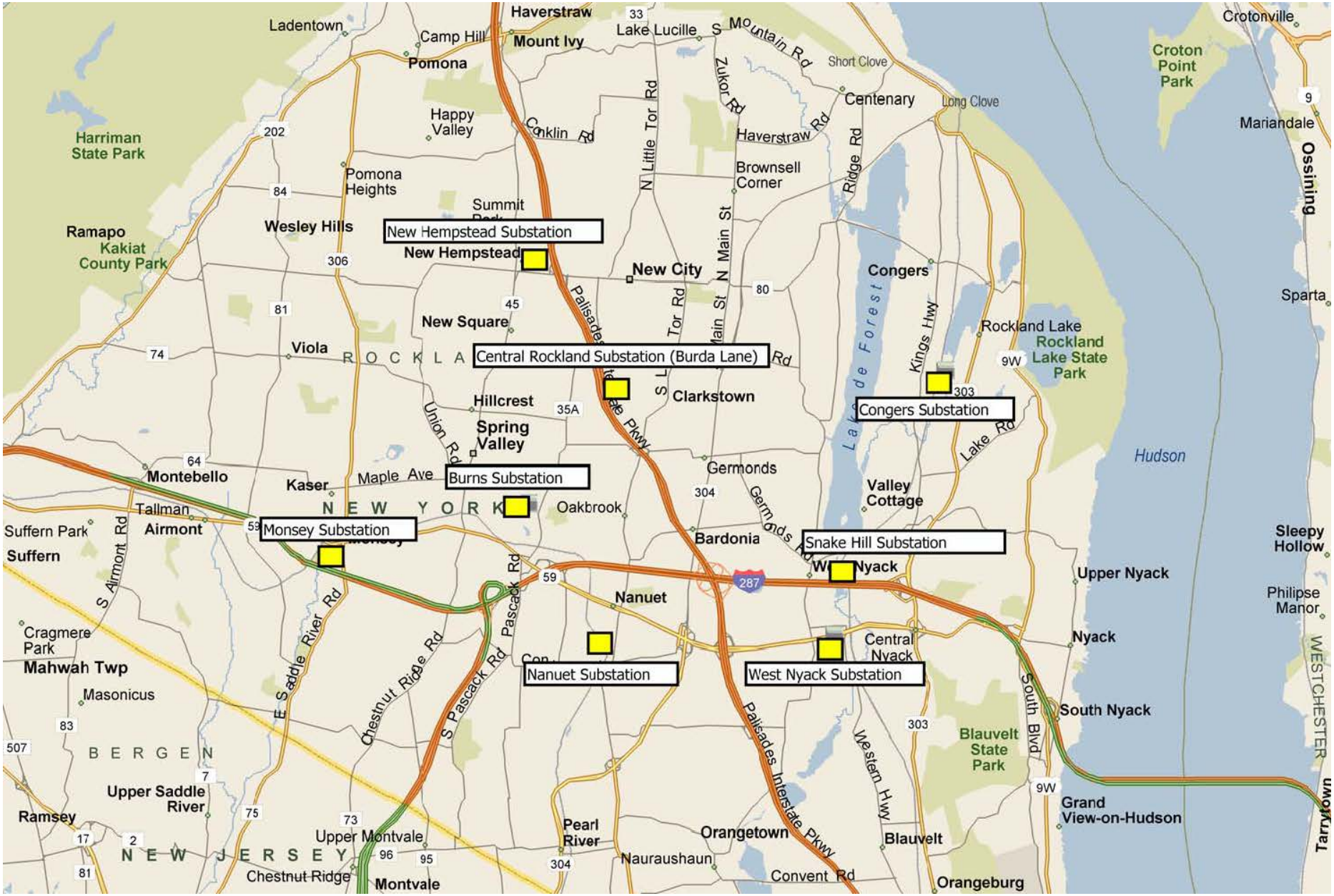
5) Please see attachments DPS30-451 Att-2 through DPS30-451 Att-5.

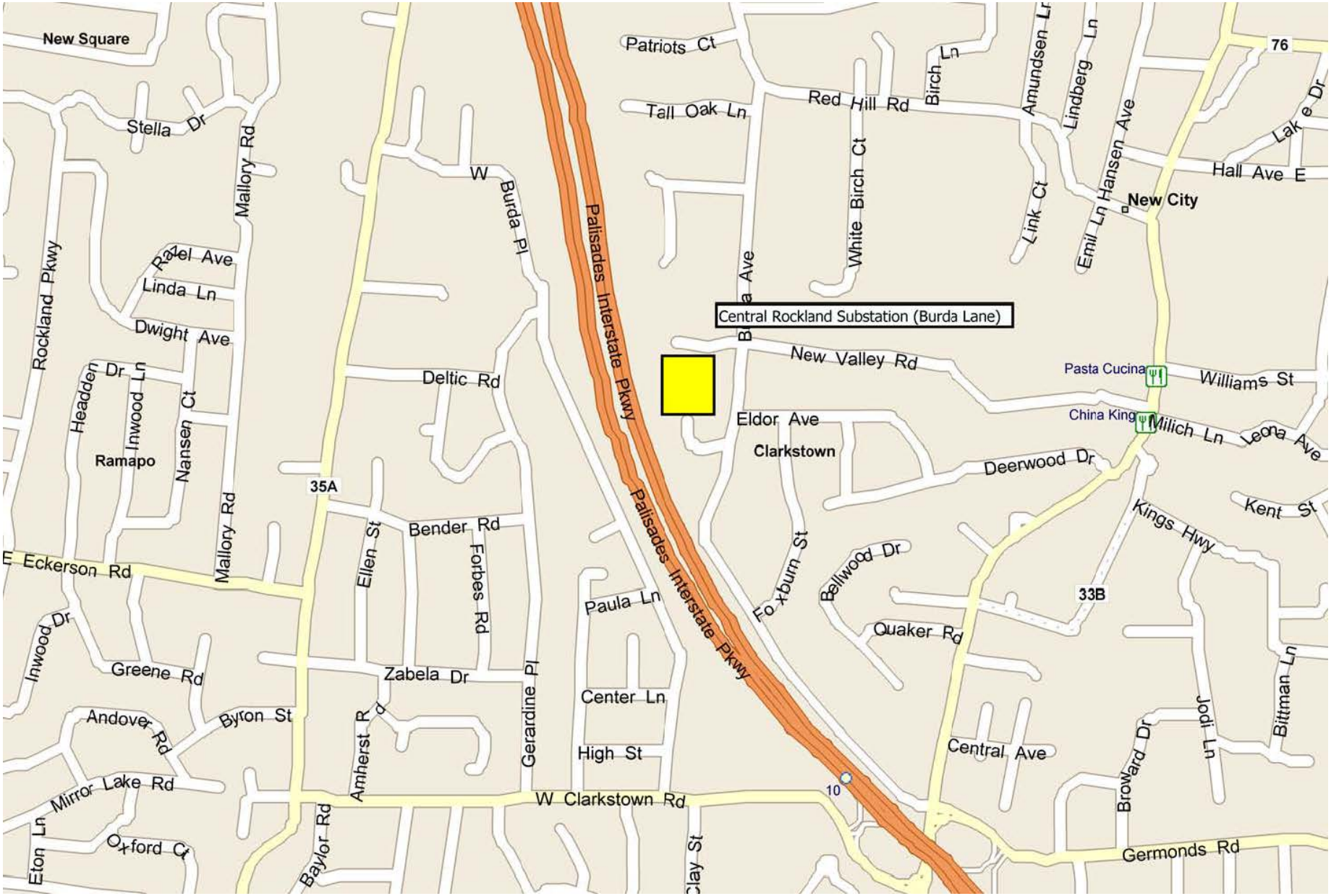
6) Please see attachment DPS30-451 Att-6.

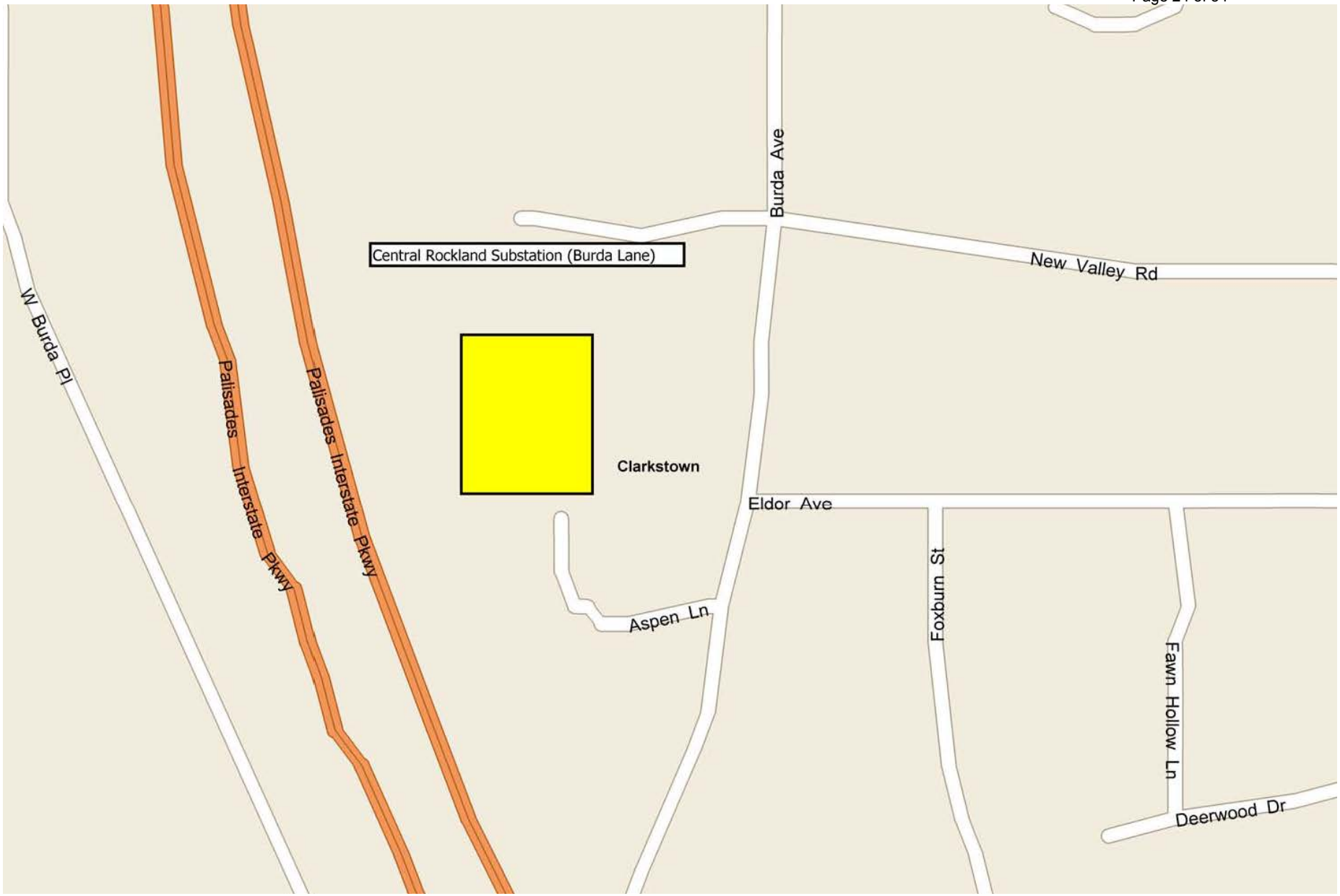
7) There are several factors that would influence this decision. In coming years, the Company expects an increased opportunity to interconnect customer-owned distributed generation as a result the REV proceeding, as well as NYSERDA, EPRI and DOE grants. This increase in interconnections could require the Company to add personnel in order to comply with SIR requirements. In addition, any decision to expedite the smart grid implementation program would require additional resources in various areas of the Company to be able to systematically roll-out the plan in an effective manner.

1. The Company's Smart Grid proposal will reduce the customer hours of interruption to 32,000 in 2019 by utilizing the automated equipment and eliminating manual switching and will defer the need for the construction of a substation and underground transmission facilities for a cost of $40 million. This deferral results in a 10-year (i.e., from 2019 to 2029), rather than a 25-year, net present-value savings of $7.38 million
2. The automated remote control of switching was shown through a Monte Carlo storm-response simulation to provide over $7,500,000 present-value savings in crew time in storm response over the same 10-year period.
3. The Smart Grid plan involves much lower short-term investments in automated switches, reclosers, and sensors. These investments improve reliability performance of the relevant circuits to such an extent that the upgrades reflected in the conventional plan are not needed until 2029. Though inflation increases the investment cost in nominal terms, the present value savings for the Smart Grid plan are just over $7 million.
4. Deferred investments may be further deferred into the future as new technologies and techniques for reliability support are developed. Economic deferral of conventional investments preserves the option of taking advantage of new technologies as they arise. Shorter timeframes were not studied due to the need not occurring until 2029. A shorter

timeframe would place costly infrastructure in the rate base before it is projected to be needed.


New Hempstead Substation
Central Rockland Substation (Burda Lane)
Congers Substation
Burns Substation
Monsey Substation
Snake Hill Substation
Nanuet Substation
West Nyack Substation
Haverstraw
Ladentown
Camp Hill
Mount Ivy
Lake Lucille
Mountain Rd
Short Clove
Croton Point Park
Crotonville
Pomona
Happy Valley
Conklin Rd
Centenary
Long Clove
Mariandale
Harriman State Park
Pomona Heights
Brownsell Corner
Haverstraw Rd
Ridge Rd
Ossining
Summit
Wesley Hills
Ramapo
Kakiat County Park
New Hempstead
New City
Congers
Sparta
New Square
Rockland Lake
Rockland Lake State Park
Viola
ROCKLAND
Palisades Interstate Pkwy
Tor Rd
Main St
Kings Hwy
Lake Forest
Clarkstown
Hillcrest
Spring Valley
Union Rd
Hudson
Lake Rd
Germonds
Valley Cottage
Montebello
Kaser
Maple Ave
NEW YORK
Oakbrook
Tallman
Suffern Park
Airmont
Suffern
Bardonia
Sleepy Hollow
Upper Nyack
Philipse Manor
Nyack
Nanuet
Central Nyack
Cragmere Park
Mahwah Twp
Masonicus
Saddle River Rd
Chestnut Ridge Rd
S Pascack Rd
Pascack Rd
Palisades Interstate Pkwy
Western Hwy
South Blvd
South Nyack
Blauvelt State Park
BERGEN
Upper Saddle River
Ramsey
Upper Montvale
Pearl River
Orangetown
Blauvelt
Grand View-on-Hudson
Tarrytown
NEW JERSEY
Chestnut Ridge
Montvale
Nauraushaun
Convent Rd
Orangeburg
WESTCHESTER


New Square
Stella Dr
Mallory Rd
Rockland Pkwy
Rachel Ave
Linda Ln
Dwight Ave
Headden Dr
Inwood Ln
Nansen Ct
Ramapo
Mallory Rd
E Eckerson Rd
Inwood Dr
Greene Rd
Andover Rd
Byron St
Mirror Lake Rd
Eton Ln
Oxford Ct
Baylor Rd
W Burda Pl
Deltic Rd
35A
Bender Rd
Ellen St
Forbes Rd
Amherst Rd
Zabela Dr
Gerardine Pl
Palisades Interstate Pkwy
Patriots Ct
Tall Oak Ln
Red Hill Rd
Birch Ln
Amundsen Ln
Lindberg Ln
76
Lake Dr
Hall Ave E
New City
Emil Ln
Hansen Ave
White Birch Ct
Link Ct
Central Rockland Substation (Burda Lane)
New Valley Rd
Pasta Cucina
Williams St
China King
Milich Ln
Leona Ave
Eldor Ave
Clarkstown
Deerwood Dr
Kent St
Kings Hwy
Foxburn St
Bellwood Dr
33B
Quaker Rd
Paula Ln
Center Ln
High St
Central Ave
Broward Dr
Joan Ln
Bittman Ln
W Clarkstown Rd
10
Clay St
Germonds Rd


Central Rockland Substation (Burda Lane)
Clarkstown
Burda Ave
New Valley Rd
W Burda Pl
Palisades Interstate Pkwy
Palisades Interstate Pkwy
Eldor Ave
Aspen Ln
Foxburn St
Fawn Hollow Ln
Deerwood Dr

ORANGE AND ROCKLAND UTILITIES, INC.

POSITION DESCRIPTION

TITLE: Operating Supervisor

DEPARTMENT: Electric Distribution Control Center

REPORTS TO: Section Manager – Electric Distribution Control Center

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PRIMARY FUNCTION:

On a rotating shift basis and under the general supervision of the Section Manager, Distribution Switching Coordinator and Trainer the Operating Supervisor (OS) has complete operating authority and jurisdiction over the electric distribution system with responsibility for its day-to-day operation including oversight and guidance of field personnel when switching, performing system repairs, or installing and removing electric distribution equipment. The OS must develop proficiency in the principles of operating an electric power system with emphasis placed on the operation and understanding of distribution equipment.

DUTIES AND RESPONSIBILITIES:

1. Ensures knowledge and implementation of Company safety, health and environmental programs for employees whose work is directed. Ensures that safe work practices are followed and the environment is fully protected in accordance with Company policy and governmental regulations.
2. Is committed to the Way We Work Principles, and adheres to the Company's Standards of Business Conduct and other Company procedures including Environmental, Health and Safety ("EH&S"), Equal Employment Opportunity ("EEO"), discipline, and security.
3. Accurately develops required planned and emergency distribution switch orders within NRG or initiates other actions to ensure the safe, secure and reliable operation of the electric distribution system while avoiding unnecessary customer outages, unsafe conditions and operating errors.
4. Operates the electric distribution system in accordance with all applicable guidelines including but not limited to company policy, the collective bargaining agreement, OSHA and internal safety, operating and work procedures.
5. Seek guidance, as necessary, to ensure response to emergencies in a timely manner commensurate with current corporate guidance and communicates that response to proper company personnel. Manages field forces, supervisory and weekly, to ensure that emergency work is progressing by managing and facilitating resources necessary to complete the job.

6. Supervises the service operators including managing their performance and workload to ensure efficient use of company resources and reduce inconsistencies, specifically in the areas of company callouts, dispatch of crews, updates to OMS and WMS and timely updates to the management staff on duty. Directs and enforces the provisions of the collective bargaining agreement, corporate and departmental policies. Participates in the disciplinary process if/when necessary.
7. Coordinates the operation of substation distribution equipment with the System Operator, including planned and emergency switching, clearance requests and equipment repairs, in a timely and accurate manner.
8. Ensures timely and accurate incident updates, to include but not limited to: notifications to internal and external entities, ERH/ETR information, proper damage assessment information entry, active working status and completion steps.
9. Ensures that notifications are prepared and distributed as per OI-2N-DCC for conditions such as accidents, outage analysis, operating errors or deficiencies, system maintenance requirements, as well as on day-to-day activities.
10. Ensures full compliance to all external regulatory related activities as they apply to the electric distribution system, including timely and accurate event reporting.
11. Provides quality assurance by:
    a. Actively assessing the department's compliance to specifications, procedures, rules and regulations, identifying deficiencies and their root causes; and
    b. Correcting deficiencies for overall improvement to avoid errors, enhance productivity, improve electric service reliability and ensure compliance.
12. Reviews department weekly employee timesheets. Timesheets must be reviewed daily for accuracy according to roll call and departmental guidelines.
13. Performs other related assignments, as required.

REQUIREMENTS OF THE JOB:

Physical:

1. Must be able to work a rotating shift
2. Must be available to work extended overtime, especially during weather-related storms and other significant distribution system events
3. This is a fixed post position and does require the ability to sit for long periods of time.

Regulatory, Certification, Other:

1. Must pass a behavioral assessment
2. Must successfully pass a Personnel Risk Assessment which includes a 7-year background check, and training associated with NERC Critical Infrastructure Protection Standards (CIPS).
3. Must pass drug/alcohol testing as required by departmental policy
4. Due to the extensive training associated with this position, the department expects a two year commitment that starts once the candidate completes the training program and qualifies as an Operating Supervisor.
5. Within 6 months of date of hire, must progress to Qualified OS status by achieving a thorough working knowledge of the electric distribution system, Company and Departmental policy,

procedures, legal & ethical requirements, safety and environmental practices and be proficient in the use of Microsoft Office (Excel, Outlook, PowerPoint, and Word), WMS, OMS, NRG and other operational or Windows based software utilized in the Corporation.

6. Must possess strong oral and written communication skills, including the capacity to communicate effectively with union personnel, executives and other levels of management, the public, as well as with other departments.

Educational:

1. Must have:
    - Bachelors degree, preferably in Electrical Engineering, with 2 years of Control Center or Operations experience; **OR**
    - Associates Degree with at least 4 years of Control Center or Operations experience; **OR**
    - High School Diploma/GED with 5 years of Control Center or Operations experience.

JOB SPECIFICATIONS

JOB DESCRIPTION:	CLASSIFICATION NO.
Equipment Technician 1st Class	**120.3**
TYPE OF JOB: **Special Scheduled: 7 AM – Midnight; Mon - Sat**	OCC. GROUP: **1**
DIVISION: **All**	

DUTIES:

Under direct or general supervision to perform, record, analyze and interpret the results of all tests required for the installation, operation and maintenance of all types of field installed equipment, and/or direct the work of others from time to time and in addition:

1) **Perform any work required for the operation and maintenance of all field installed reclosers, remote operated switches (SF6), regulators, sophisticated capacitor bank controller, supervisory controls, communication systems (SCADA, SMART GRID), sectionalizers and load loggers/recorders and other meters associated with engineering studies in the overhead and underground system.**
2) **Install, replace and energize control cabinets on regulators, reclosers & sectionalizers.**
3) **Performs, records, analyzes and interprets the results of power quality studies on field or customer equipment or locations.**
4) **Shall perform RF, TVI, noise level and infrared related functions on company and customer owned equipment.**
5) **To perform computer and programming tests of field equipment of the most complexity.**
6) **To perform switching of the overhead and underground system in order to isolate the equipment to perform maintenance duties.**
7) **May be assigned as a 1 person crew for programming, downloading & inspection tasks in shop, company yard, customer locations, site safety locations.**
8) **Perform other similar or less skilled work as required.**
9) **Performs duties in accordance with company safety rules and good housekeeping practices.**
10) **Supplemental overhead line emergency restoration duties to include make-safe switching, and secondary services on both customer and pole side.**

QUALIFICATIONS:

1. **Must be in sound physical condition.**
2. **Must have a high school education or its equivalent.**
3. **Must have 2 years as Equipment Technician 2nd Class.**
4. **Must be qualified to perform any installation and maintenance work on field installed electrical equipment including difficult, complicated and congested work.**
5. **Must have a thorough working knowledge of the construction, theory of operation and the application of all types of protective equipment, electronics, thorough working knowledge of A.C. and D.C. circuitry, including 3 phase AC power systems and the operation, programming and maintenance of the equipment associated therewith.**
6. **Must be able to read and interpret plans, drawing, specifications, wiring diagrams, schematics and circuit maps.**
7. **Must have a basic working knowledge of computers (laptop and/or desktop) and software applications.**
8. **Must pass a written and hands-on skills evaluation to display proficiency in the classification they have completed.**
9. **Must be able to possess & maintain a valid CDL driver's license to drive and operate aerial equipment.**
10. **This position is subject to drug testing as required by governmental regulations.**

DATE:	DIRECTOR - LABOR RELATIONS
June 1, 2009	

ORANGE AND ROCKLAND UTILITIES, INC.

JOB SPECIFICATIONS

JOB DESCRIPTION:	CLASSIFICATION NO.
Equipment Technician Chief	**120.2**
TYPE OF JOB: **Special Scheduled: 7 AM – Midnight; Mon - Sat**	OCC. GROUP: **1**
DIVISION: **All**	

DUTIES:

Under general supervision, to act as a working supervisor in charge of others who may be assigned to perform, record, analyze and interpret the results of all tests required for the installation, operation and maintenance of all types of field installed equipment, and/or direct the work of others from time to time and in addition:

1) **Perform any work required for the operation and maintenance of all field installed reclosers, remote operated switches (SF6), regulators, sophisticated capacitor bank controller, supervisory controls, communication systems (SCADA, SMART GRID), sectionalizers and load loggers/recorders and other meters associated with engineering studies in the overhead and underground system.**
2) **Install, replace and energize control cabinets on regulators, reclosers & sectionalizers.**
3) **Performs records, analyzes and interprets the results of power quality studies on field or customer equipment or locations.**
4) **Shall perform RF, TVI, noise level and infrared related functions on company and customer owned equipment.**
5) **To perform computer and programming tests of field equipment of the most complexity.**
6) **To perform switching of the overhead and underground system in order to isolate the equipment to perform maintenance duties.**
7) **May be assigned as a 1 person crew for programming, downloading & inspection tasks in shop, company yard, customer locations, site safety locations.**
8) **Perform other similar or less skilled work as required.**
9) **Performs duties in accordance with company safety rules and good housekeeping practices.**
10) **Supplemental overhead line emergency restoration duties to include, make-safe switching, and secondary services on both customer and pole side.**
11) **Shall train those in lower grades, perform related or less skilled duties as assigned, and at all times shall see that Company Safety Rules and Good Housekeeping practices are followed.**

QUALIFICATIONS:

1. **Must be in sound physical condition.**
2. **Must have a high school education or its equivalent.**
3. **Must have 2 years as Equipment Technician 1st Class.**
4. **Must have the ability to exercise good judgment while working with the public and in the handling and coordinating of the work for the personnel under their direction and be able to train employees assigned to them.**
5. **Must be qualified to perform any installation and maintenance work on field installed electrical equipment including difficult, complicated and congested work.**
6. **Must have a thorough working knowledge of the construction, theory of operation and the application of all types of protective equipment, electronics, thorough working knowledge of A.C. and D.C. circuitry, including 3 phase AC power systems and the operation, programming and maintenance of the equipment associated therewith.**

7. **Must be able to read and interpret plans, drawing, specifications, wiring diagrams, schematics and circuit maps.**
8. **Must have a basic working knowledge of computers (laptop and/or desktop) and software applications.**
9. **Must pass a written and hands-on skills evaluation to display proficiency in the classification they have completed.**
10. **Must be able to possess & maintain a valid CDL driver's license to drive and operate aerial equipment.**
11. **This position is subject to drug testing as required by governmental regulations.**

DATE:	**DIRECTOR -LABOR RELATIONS**
June 1, 2009	

Position Detail

Engineer - O&R 1H
Sr Engineer - O&R 2L
Principal Engineer 2H

Position Information

Department: OR Distribution Elec Standards

QUALIFICATIONS:

Core:

O&R Electrical Engineering is seeking to hire an Engineer/Sr. Engineer/Principal Engineer to join its Distribution Protection Engineering team. **This position requires candidates to demonstrate in the application they possess the following required skills and abilities:**

- Capable of independent work including ability to understand the operation and design of distribution related equipment and systems.
- Computer literacy with proficiency in Windows environments and Microsoft Office(Outlook, Word, Excel, PowerPoint, Access) and Project.
- Must have demonstrated leadership skills and the ability to work well in team situations; be willing and able to participate and lead in cross-functional teams as required.

Engineer (Band 1H)

- The qualified candidate must have a Bachelor's of Science degree in an Engineering discipline with a minimum of 2 years' related experience in electric distribution systems engineering.

Sr. Engineer (Band 2L)

- Bachelor of Science in Engineering is required with a minimum of 5 years in Electrical Engineering and/or Electric Operations.
- Experienced engineer capable of performing complex analysis, designing, installing and troubleshooting distribution protection, distributed resource and power quality systems and equipment.

Principal Engineer (Band 2H)

- Bachelor of Science in Engineering is required with a minimum of 8 years' experience in Electrical Engineering and/or Electric Operations with at least 3 years' experience in distribution protection, distributed resource interconnection and power quality.
- A high degree of knowledge in distribution protection, distributed resource interconnection and power quality required.
- Must be experienced with and capable of running large projects.

Additional:

Engineer /Sr. Engineer/Principal Engineer: Bachelor of Science degree in Electrical Engineering is preferred.

Sr. Engineer: Familiarity with distribution protection, distributed resource interconnection and power quality issues is preferred.

Principal Engineer: Obtained or working towards Professional Engineering License in NY, NJ, and/or PA preferred. Supervisory skills are preferred.

RESPONSIBILITIES:

Core:
Ensures implementation of Company safety, health and environmental programs for employees whose work is directed. Ensures that safe work practices are followed and the environment is fully protected in accordance with Company policy and governmental regulations. Is committed to the Way We Work Principles, and adheres to the Company's Standards of Business Conduct and other Company procedures including Environmental, Health and Safety ("EH&S"), Equal Employment Opportunity ("EEO"), discipline, and security.

Attends departmental meetings and training, and serves on committees as required. Prepares authorizations and purchase requisitions as required. Keeps informed of the industry and keeps up-to-date with the latest developments in the Smart Grid and Automation Engineering field. Participates in the Company's emergency management processes and storm plans. Performs other related assignments as required.

Engineer (1H)

Under general supervision of the Section Manager-Smart Grid Engineering, exercises considerable individual judgment in performing distribution protection studies, protective device coordination, providing guidance to customers installing distributed resources and investigating and mitigating power quality problems. The engineer shall attend industry meetings as required. Under general guidance of the Senior or Principal Engineer , serves as Project Engineer for all projects assigned.contract. Works closely with manufacturers, contractors, and suppliers relative to proposals, project performance, specification of equipment, and processing of invoices for payment in accordance with their performance under contract.

Prepares authorizations and purchase requisitions as required. Under general guidance of a Senior Engineer or Principal Engineer, maintains cost control over projects as required. Under general guidance of a Senior Engineer or Principal Engineer: a. Performs short circuit analysis studies b. Performs fuse coordination studies c. Determines station breaker settings for distribution circuits d. Determines recloser settings e. Designs automatic protection schemes f. Evaluates new protection equipment g. Works with Division Engineers and customers to investigate and mitigate power quality problems.. h. Installs diagnostic and test equipment on customer equipment and directs company employees when installing diagnostic and test equipment on company facilities.

Becomes familiar with regulatory requirements for distributed resources and working under general guidance of a Senior Engineer or Principal Engineer. Works with customers installing distributed resources to insure compliance with O&R interconnection specifications. Inspects distributed resource installations for compliance with O&R specifications. Keeps informed of the industry and keeps up-to-date with the latest developments in the Distribution Protection, Distributed Resource and Power Quality Engineering fields. Participates in the Company's emergency management processes and storm plans. Performs other related assignments as required.

Senior Engineer (Band 2L)

With limited supervision of a Principal Engineer or Section Manager, exercises considerable individual judgment in: performing distribution protection studies, protective device coordination; providing guidance to customers installing distributed resources; and investigating and mitigating power quality problems. Attends and represents the Company at industry meetings and serves on committees, as required. Serves as Project Engineer for all projects assigned. Works closely with manufacturers, contractors, and suppliers relative to proposals, project performance, specification of equipment, and processing of invoices for payment in accordance with their performance under contract. Maintains cost control over projects as required. Performs short circuit analysis and fuse coordination studies. Determines recloser settings and station breaker settings for distribution circuits. Designs automatic protection schemes. Is familiar with regulatory requirements for distributed resources. Inspects distributed resource installations for compliance with O&R specifications. Performs other related assignments as required.

Principal Engineer

Serves as technical expert in the areas of Distribution Protection, Distributed Resource interconnection and power quality. Requires considerable independent judgment in performing distribution protection studies, protective device coordination, and providing guidance to customers installing distributed resources or when

investigating and mitigating power quality problems. Attends and represents the Company at industry meetings and serves on committees as required. Serves as Project Engineer for all projects assigned. Supervises manufacturers, contractors, and suppliers in relation to performance under contract. Supervises and directs the work of lower band employees working on distribution protection, distributed resource interconnection and on power quality issues. Prepares authorizations and purchase requisitions as required. Maintains cost control over projects as required. Performs short circuit analysis and fuse coordination studies. Evaluates new protection equipment. Is thoroughly familiar with regulatory requirements for distributed resources. Inspects distributed resource installations for compliance with O&R specifications. Participates in the Company's emergency management processes and storm plans. Performs other related assignments as required.

Additional:

PHYSICAL REQUIREMENTS:

Core:

- Must participate and be available to be on call, work off-shifts, weekends, holidays and overtime for off- hour emergency response activities and / or as operating and system conditions require.
- Must have a valid Driver’s License.
- Must be able and willing to travel within Company service territory and to other company locations as needed.

Additional:

Orange and Rockland Utilities

Operations

October 2014

Francis W. Peverly
Vice President

Gas Operations
Glenn Meyers
General Manager

- **Eastern Gas Operations**
  OPEN
  Section Manager
- **Northern Gas Operations, Corrosion Control & GTO**
  Donald Higgins
  Section Manager
- **Gas Energy Response Ctr, Damage Prevention & GMD**
  Joseph T. Mandara
  Section Manager
- **Compliance**
  Paul Dillon
  Manager
- **Work Management**
  Jacqueline Winter
  Senior Planning Analyst

Electric Operations
E. Patrick Burke
General Manager

- **Eastern Electric Operations**
  Stephen G. McCready
  Section Manager
- **Northern Electric Operations**
  Kevin M. Waldron
  Section Manager
- **Contract Services**
  Stephen T. Prall
  Section Manager
- **Transmission & Distribution Maintenance**
  Yanhia Attianese
  Section Manager
- **Operations Support**
  James O. Clawson, III
  Section Manager
- **Compliance**
  Joseph B. Nash, Jr.
  Manager
- **Work Management**
  Brian Palmatier
  Senior Planning Analyst

Gas Engineering
Flannan C. Hehir
Director

- **Contract Administration**
  Gary M. Windman
  Construction Manager
- **Gas Engineering Projects - Systems**
  Debra M. DiMeo
  Section Manager
- **Gas Control**
  Michael A. Lang
  Section Manager
- **Gas Engineering Projects - Facilities**
  Michael T. Turanchik
  Section Manager

Control Center & Substation Operations
Michele M. Hanebuth
Director

- **Substation Operations**
  Salvatore F. Muto
  Section Manager
- **System Operations**
  Ralph P. Devitto, Jr.
  Chief System Operator-O&R
- **System Distribution**
  Jeremy G. McVey
  Section Manager
- **Support Service**
  Edward G. Kopf, Jr.
  Section Manager
- **Compliance**
  Edward P. Bedder
  Program Manager
- **Critical Infrastructure Protection (CIP)**
  Scott T. Dunwoody
  Section Manager

Electrical Engineering
Angelo M. Regan, PE
Director

- **Transmission & Substation Engineering**
  John F. Coffey, PE
  Chief Engineer-O&R
- **Distribution Engineering**
  Wayne A. Banker, PE
  Chief Engineer-O&R
- **Smart Grid**
  Charles Scirbona
  Department Manager
- **Performance & Operational Engineering**
  Brian J. Nugent
  Section Manager
- **Systems Engineering**
  Keith Brideweser
  Section Manager
- **Technology Engineering**
  Joe N. White
  Section Manager

Project Management
Dave V. Work, PE,PMP
Department Manager

- **Business Services**
  Suzanne P. Sweeney
  Manager
- **Construction**
  James A. Carbone
  Manager
- Diego G. Morales, PE
  Principal Engineer
- **Project Controls**
  Jacqueline M. Frosco
  Project Manager-O&R
- **Project Management**
  Michael Curran
  Project Manager-O&R
- Erik A. Denega, PE
  Project Manager-O&R
- Thomas Frisbie,PE
  Project Manager- O&R
- Joanne H. Lanza
  Project Manager-O&R
- Jeffrey W. Peifer,PE
  Project Manager-O&R
- **Cost Analysis**
  Mary Jane Zazzero
  Senior Specialist

Operations Systems Support
Allisyn C. Glasser
Program Manager

- **Application Development**
  Dominick C.Devito
  Systems Specialist
- **Business Analysis**
  Eric Benezra
  Senior Specialist
- **Regulatory**
  Karleigh F. Murphy-Rodriguez
  Senior Specialist

Cost Management/ Performance
Kenneth McKenna
Section Manager

- Angelina Brady
  Senior Analyst
- Kimberly Marazzo
  Senior Analyst
- Hillary Moreau
  Senior Analyst

Distributed by Compensation

Supersedes September 2014