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July 19, 2013

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Jeff Derouen
KENTUCKY PUBLIC SERVICE COMMISSION
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HAND DELIVERY

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JUL 19 2013

PUBLIC SERVICE
COMMISSION

Re: PSC Case No. 2013-00221
*Joint Application of Kenergy Corp. and Big Rivers Electric Corporation
for Approval of Contracts and for A Declaratory Order*
Our Client: Century Aluminum of Kentucky General Partnership
File No. R0145.01328

Dear Mr. Derouen:

Enclosed are an original and ten copies of Century Aluminum of Kentucky General Partnership's: (1) Direct Testimony of Donald J. Morrow, Quanta Technology, LLC, with exhibits; (2) Direct Testimony of Sean Byrne, Plant Manager – Hawesville Smelter, with exhibits; and (3) Direct Testimony of Michael Early, Corporate Energy Director, for filing in the above-referenced matter.

I certify that on this date a copy of the these documents has been served on all persons on the attached service list by first class U. S. mail, postage prepaid.

Sincerely,

Bernard F. Lovely

BFL/mh

Enclosures: Listed above

Cc: Service List attached

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JUL 19 2013

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY
PUBLIC SERVICE
COMMISSION

In the Matter of:

Joint Application of Kenergy Corp.)
and Big Rivers Electric Corporation)
for Approval of Contracts and for) Case No. 2013-00221
A Declaratory Order)

DIRECT TESTIMONY

OF

**DONALD J. MORROW,
QUANTA TECHNOLOGY, LLC**

ON BEHALF OF

CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

FILED: July 19, 2013

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DIRECT TESTIMONY

OF

DONALD J. MORROW

Q. Please state your name, business address, and educational background.

A. My name is Donald J. Morrow. I currently am a Partner and Senior Vice President Advisory Services at Quanta Technology, LLC with a business address of Suite 300, Westchase Blvd, Raleigh, NC 27607. I have a Bachelor's Degree in Electrical Engineering and an Executive MBA, both from the University of Wisconsin, Madison. I am a registered professional engineer in good standing in the States of Wisconsin and Arkansas.

Q. Briefly describe your current position.

A. I currently oversee the Advisory Services Practice at Quanta Technology. The Advisory Services group provides technical consulting in a variety of areas, including transmission operations, transmission planning, energy policy, Automation, Smart Grid, Asset Management, Renewable Integration, FACTS device deployment, and Laboratory Services. In this capacity I also continue to provide consulting services to clients. My consulting practice primarily focuses on electric transmission in the area of system operations, system planning, and energy policy.

1 **Q. Briefly describe your work history.**

2 A. I have been in the industry for 31 years. Prior to my current position, I
3 served as Vice President Transmission at Quanta Technology,
4 beginning in 2006. In that position, I focused on transmission analysis
5 to support system operations, system economics, system planning and
6 capital budgeting. I led projects in the development of transmission
7 master plans, identifying strategic approaches for engaging
8 construction contractors on transmission projects, implementing
9 Electric Reliability Organization ("ERO") compliance programs, and
10 establishing system restoration plans that were compliant with North
11 American Electric Reliability Corporation ("NERC") standards. While
12 in this role, I also created the NERC Standards Compliance practice at
13 Quanta Technology. Prior to joining Quanta Technology, I served as
14 Director of Operations at American Transmission Company ("ATC"),
15 which is a for-profit, stand-alone transmission company in the Upper
16 Midwest. In that role, I was responsible for the formation of the
17 system operations department for the startup of ATC on January 1,
18 2001. This startup included the setting up of two control centers that
19 oversaw transmission system operations in Wisconsin, Iowa, and the
20 upper peninsula of Michigan. Before I left ATC, I also served as
21 Director of System Planning & Protection. Prior to my role at ATC, I
22 served as Senior Director, Systems Operation for Madison Gas and

1 Electric Company ("MGE"). In this role, I oversaw the distribution,
2 transmission and generation operations for the company. From my
3 time at MGE and ATC, I developed extensive transmission outage
4 management experience. At both organizations, I oversaw the
5 maintenance schedulers who worked with the engineering and field
6 operations groups to schedule outages, develop outage plans, and
7 define work clearance zones. I was also accountable for the training of
8 the system operators in the tagging and clearance procedures to
9 establish work zones and for the system operators' use of those
10 procedures in the issuance of holdout tags for equipment during
11 maintenance activities. At ATC, I was also responsible for creating the
12 Emergency Response Plan for the organization to coordinate outage
13 restoration activities during system emergencies. At MGE, I was
14 responsible for updating the system restoration plan. At both
15 organizations, I helped organize and conduct table-top and other
16 emergency restoration drills.

17 **Q. Describe your experiences with energized maintenance**
18 **practices in transmission.**

19 A. In 2003, while at ATC, staff under my direction evaluated the option to
20 rebuild the 345 kV Paddock to Rockdale line using energized
21 construction techniques. At Quanta Technology, I worked with Quanta
22 Energized Services ("QES") to evaluate performing energized

1 maintenance work on a 230 kV facility in Florida. I have also
2 investigated cost recovery issues in regional energy markets.

3 **1. Overview of Energized Transmission Maintenance**

4 **Q. What is meant by the term “energized transmission**
5 **maintenance”?**

6 A. For the purposes of this testimony, energized maintenance (which is
7 also known in the industry as "live-line maintenance" or "hot-wire
8 maintenance") is maintenance performed directly on energized
9 transmission equipment and maintenance activities that use
10 specialized equipment and techniques to establish safe work clearance
11 zones to maintain minimum accepted distances while keeping nearby
12 equipment (e.g., transmission lines) energized and in-service.

13 **Q. What voltages constitute transmission?**

14 A. For the purposes of this testimony, transmission voltages are assumed
15 to be 69,000 volts (69 kV) and above.

16 **Q. What methods are in use today for performing energized**
17 **transmission maintenance directly on energized equipment?**

18 A. In general, there are three main approaches to energized maintenance
19 – bare hand, hot stick, and rubber gloves. For transmission equipment
20 work, bare hand and hot stick methods are primarily used.

21 **Q. Briefly describe bare hand techniques**

1 A. Bare hand work is carried out on energized high and extra high-
2 voltage lines with the line workers normally wearing conductive
3 clothing. While performing the work, the line worker is in contact with
4 the energized line while insulated from earth and other electrical
5 potentials. The practice operates from the principle that a line worker
6 can safely be in contact with an energized line, provided that the line
7 worker is effectively insulated from all other objects that could be at a
8 different voltage potential. The application of this method requires the
9 use of conductive clothing and electrical insulating equipment to gain
10 access to the energized conductor or fitting while maintaining
11 adequate air clearance as insulation from other objects at different
12 electrical potential. Bare hand energized maintenance can be ground-
13 based, structure-based, helicopter-based, or scaffold-based. Ground-
14 based energized maintenance means that access to the live equipment
15 is provided from the ground using insulated equipment such as an
16 insulating ladder, insulated elevated work platform, insulated boom
17 truck, or insulated crane. Exhibit 1 shows an example of ground-based
18 bare hand techniques using a bucket truck to change spacers on a 500
19 kV line. Exhibit 2 shows a close up picture of bare hand techniques in
20 a training exercise to repair damaged 345 kV conductor with a splice.
21 Structure-based energized maintenance means that access to the live
22 equipment is provided from the transmission tower or structure using

1 insulated equipment such as an insulated ladder or ropes. Exhibit 3
2 shows an example of structure-based bare hand techniques to change
3 out insulators on a 345 kV line with H frame wood structures.
4 Helicopter-based energized maintenance means that access to the live
5 equipment is from the air using platforms extended from the frame of
6 the helicopter. Helicopters are also used to insert workers onto
7 energized equipment using ropes. Exhibit 4 shows an example of a
8 helicopter inserting a worker on energized transmission conductor.
9 Scaffold-based energized maintenance is a specific type of ground-
10 based energized maintenance, which provides access to the live
11 equipment from an insulated scaffold that has been built to support
12 the workers and their tools working on the live equipment. Exhibit 5
13 shows an example of scaffold-based bare hand techniques to install and
14 energize a new switch. The scaffolding-based approach is generally
15 used for energized maintenance in substations. The structure-based
16 and helicopter-based approaches are generally used for energized
17 maintenance on overhead transmission lines. Ground-based
18 approaches (excluding insulated scaffolding) may be used for both
19 overhead transmission lines and substations.

20 **Q. Briefly describe hot stick techniques.**

21 A. The hot stick method is based on the principle that the line worker
22 shall always maintain a minimum approach distance from any

1 energized high voltage line or equipment. In this case, the line worker
2 stays at a different electrical potential than the energized equipment.
3 Maintenance work performed on energized equipment uses tools and
4 equipment that are fitted to insulating sticks. Hot stick energized
5 maintenance can be ground-based, structure-based, or scaffold-based.
6 Exhibit 6 shows an example of ground based hot stick maintenance
7 techniques to change insulators on a 115 kV line. Hot sticks are not
8 used for helicopter-based energized maintenance.

9 **Q. What methods are used to maintain safe work clearance zones?**

10 A. Safe clearances may be maintained by moving energized equipment to
11 provide sufficient access for workers to maintain minimum accepted
12 distances during maintenance activities. For bare hand work, this
13 may be achieved by using ropes, pulleys, hot sticks or more advanced
14 equipment such as robotic booms to move equipment. Robotic booms
15 or temporary structures may also be used to move energized circuits
16 out of the way for traditional, de-energized construction.

17 **Q. Briefly describe robotic techniques.**

18 A. For this technique, robotic booms are used to connect to energized
19 conductors and move the conductor out of a work zone to maintain
20 minimum accepted distances for energized or de-energized
21 construction techniques. The robotic boom will have appropriately
22 sized insulators attached to a boom that serves as a temporary

1 structure. These booms may be mounted on a truck or may have an
2 integral, motorized power system that can be controlled to move the
3 energized conductor out of the work zone. Exhibit 7 shows an example
4 of robotic booms being used to move energized conductor to expand the
5 work zone for de-energized maintenance to relocate a double circuit
6 240 kV lattice tower structure.

7 **Q. What type of maintenance activities can be performed using**
8 **energized techniques?**

9 A. Based upon Quanta Services' experience, any type of maintenance
10 activity can be performed using energized techniques. These include,
11 but are not limited to, the following activities:

- 12 > Energized reconductoring
- 13 > Single to double circuit conversion
- 14 > Close proximity new conductor stringing
- 15 > Insulator replacement
- 16 > Spacer /dampener replacement
- 17 > Structure replacement
- 18 > Structure component replacement
- 19 > Sleeve /splice replacement
- 20 > Conductor maintenance
- 21 > Inspection
- 22 > Hot spot bypass

- 1 ➤ Bus repair
- 2 ➤ Wet and dry insulator washing
- 3 ➤ Energized substation tie-in

4 **Q. What could limit the use of energized maintenance techniques?**

5 A. Generally, limitations could be based on access to and the width of the
6 transmission line right of way ("ROW") which could impede the ability
7 to deploy equipment such as robotic booms, cranes or bucket trucks.
8 Limitations may also be related to restrictions on flight patterns or
9 noise thresholds for helicopter-based methods.

10 **Q. Do any of these limitations exist in the applications requested**
11 **by Century Aluminum?**

12 A. Based upon the information provided by Century Aluminum, I am not
13 currently aware of a situation on these specific facilities that would
14 restrict the use of one or more of these energized techniques.
15 However, each maintenance type will require different methods. For
16 example, a project focusing on tower replacement requires greater
17 working clearances and access for heavier equipment than for a project
18 that focuses on replacing bad insulators. Selection of a specific
19 maintenance approach will be based upon pre-maintenance work
20 planning that should take into account issues such as easement access,
21 ROW width, flight restrictions, noise ordinances, or other issues that
22 impact the ability to deploy energized maintenance techniques.

1 Q. Are energized transmission maintenance techniques
2 considered "good utility practice" and "prudent utility
3 practice"?

4 A. Yes, the use of energized maintenance techniques, when the
5 incremental cost is justified and when they are implemented by
6 qualified, properly trained staff using well designed work practices and
7 tools, can be considered both good utility practice and prudent utility
8 practice provided the utility can recover its costs. These techniques
9 are frequently used in the industry. Since 2010, Quanta Services
10 companies have performed 52 energized projects for 18 industry
11 participants in the USA, 10 industry participants in Canada and 1
12 utility in South Africa. Since 2010, the USA client list includes
13 utilities such as AEP, XCEL, ONCOR, Kentucky Utilities, NSTAR,
14 PG&E, Northeast Utilities, and others that are recognized industry
15 leaders. In addition, Utilities Service Alliance,¹ has contracted with
16 Quanta Services to facilitate the provision of energized services at
17 approximately 30 nuclear power plant substations owned and operated
18 by 16 different companies. By performing certain maintenance
19 activities energized, the plant operator is able to keep the nuclear
20 generator on-line during these maintenance activities. Under this

¹ Utilities Services Alliance is a not-for-profit cooperative designed to facilitate collaboration among its member utilities who work together to reduce operating and maintenance costs, improve safety and performance, and provide innovation and leadership within the nuclear power industry.

1 agreement, Quanta Services has performed over 50 energized
2 maintenance projects in substations at these nuclear facilities.

3 **2. Safety Record of Energized Maintenance Techniques**

4 **Q. What is the safety record for energized maintenance**
5 **techniques?**

6 A. I only have specific information on the energized safety record for QES.
7 Both Quanta Technology and QES are wholly owned subsidiaries of
8 Quanta Services, Inc. (NYSE: PWR) and, at times, Quanta Technology
9 and QES work together on select projects. Because of this relationship,
10 I am able to obtain safety information either directly from QES or from
11 the Quanta Services corporate office. Since 1998, QES has logged over
12 4.6 million person-hours on energized maintenance and construction. I
13 am aware of only two incidents during this time (neither were
14 fatalities) that were reportable to the Occupational Safety and Health
15 Administration ("OSHA"). One of these reportable incidents resulted
16 in a loss time injury. This record translates to an average Loss Time
17 Incident Rate ("LTIR") for QES of .0435 over the 15 year period.

18 **Q. How does this safety record compare to the industry overall?**

19 A. The safety record for energized maintenance and construction at QES
20 compares very favorably with and, in fact, is superior to the industry
21 safety record for all transmission maintenance (both energized and de-
22 energized). Using information provided by our parent company,

1 Quanta Services, the overall industry LTIR for transmission
2 maintenance over the past 12 years has varied from a high of 3.4 in
3 2000 to a low of 1.1 in 2012. These industry LTIR values are available
4 from OSHA data.

5 **Q. Briefly describe the training involved for field staff in**
6 **energized techniques.**

7 A. I am only able to address the Quanta Services training program. One
8 of the main reasons for the exceptional safety record described above is
9 the experience and training of Quanta Services staff. The core group of
10 live-line advisers in QES has a combined total of more than 400 years
11 of energized work experience, starting with the first North American
12 energized reconductor project in 1990 – five miles of 161 kV
13 transmission line in Canada. Their experience is the foundation of the
14 Quanta Services-wide program of energized work procedures and
15 training. The work procedures developed by QES are fully compliant
16 with OSHA 1910.269, Electric Power Transmission and Distribution
17 Work Practices, and many of them have been adopted by the National
18 Electrical Contractors Association ("NECA") and the International
19 Brotherhood of Electrical Workers ("IBEW"). The prerequisite to
20 qualify for Quanta Services' comprehensive program for bare-hand
21 training and certification is journeyman lineman status, preferably
22 with in-depth knowledge and experience in hot stick maintenance of

1 transmission facilities. Each candidate is interviewed and thoroughly
2 evaluated prior to acceptance in the program. Each candidate receives
3 more than 120 hours of training, which includes class room and field
4 projects to learn and evaluate the theory and practical use of tools on
5 energized circuits. The QES in-house training staff has certified
6 journeymen from Quanta Services' operating units throughout North
7 America to perform live-line, bare-hand work, as well as lineman and
8 operators for use of the robotic arms on distribution and transmission
9 voltages. The Quanta Services' training program meets all accepted
10 industry standards including the U.S. OSHA Safe Work Act (1910.269)
11 and the Work Safe BC (Canada) requirements. The program has been
12 accepted by the NECA Local Line Construction Chapters and IBEW.
13 Since its inception, over 425 Quanta linemen have been certified.

14 **3. Century Aluminum Need for Energized Maintenance**

15 **Q. Describe the Century Aluminum request.**

16 A. My understanding is that Century Aluminum has requested that Big
17 Rivers Electric Corporation ("Big Rivers") install a protective relay
18 scheme to reduce load at the Hawesville Smelter for sudden loss of
19 certain transmission lines near the Hawesville Smelter. I also
20 understand that Century Aluminum has requested Big Rivers to
21 commit to have maintenance performed on these lines using energized

1 techniques in order to minimize outages, particularly sustained
2 outages, of these lines. The specific lines at issue are:

- 3 • 345 kV Davies to Coleman
- 4 • 161 kV Davis to Reid
- 5 • 161 kV Newtonville to Coleman

6 **Q. What is the purpose of this request?**

7 A. Century Aluminum has made this request for live line maintenance to
8 alleviate the need to designate the Kenneth C. Coleman Generating
9 Station (“Coleman”) as a Midcontinent Independent System Operator,
10 Inc. (“MISO”) System Support Resource (“SSR”), which would require
11 the plant to operate as a “must-run” generator.

12 **Q. What is meant by “Must-Run” and MISO SSR designation?**

13 A. Must-run means that a power plant must be on-line and generating at
14 or above a certain level to maintain required, minimum standards of
15 reliability for the operation of the Bulk Electric System (“BES”). The
16 MISO SSR designation establishes a unit that must be available for
17 MISO to effectively operate the transmission grid within applicable
18 reliability standards. Must-run units are included in this designation.
19 The process used by MISO to designate a unit as an SSR along with
20 other items such as cost recovery for study costs are covered under
21 Attachment Y of the MISO FERC approved Open Access Transmission
22 Tariff (“OATT”).

1 **Q. How is a minimum level of reliability established?**

2 A. Mandatory reliability standards are established by NERC. These
3 standards must be followed by entities that own and operate
4 equipment that comprises the North American BES and by entities
5 that utilize the North American BES to serve load or trade electricity.
6 In the United States, the Federal Energy Regulatory Commission
7 ("FERC") has ultimate responsibility for approving and ensuring
8 performance consistent with these standards. From an operational
9 standpoint, minimum levels of reliability are primarily established
10 through NERC's transmission operating procedures, which are
11 mandatory standards adopted by NERC and approved by FERC. This
12 series of standards has the designation of "TOP" in the NERC
13 numbering sequence. The TOP standards identify requirements for
14 operating the system within limits, sharing data, establishing
15 operational authority, and taking other actions necessary to ensure the
16 reliable operation of the North American BES.

17 **Q. Which standards most directly apply to the issues associated**
18 **with the potential idling of Coleman?**

19 A. There are several standards that are applicable to this situation, but a
20 closer look at two of these standards, TOP-004² and TOP-007,³ is

² [http://www.nerc.com/_layouts/PrintStandard.aspx?standardnumber=TOP-004-2&title=Transmission Operations&jurisdiction=United States](http://www.nerc.com/_layouts/PrintStandard.aspx?standardnumber=TOP-004-2&title=Transmission%20Operations&jurisdiction=United%20States) (last visited July 18, 2013).

1 useful to highlight the issues in this case. TOP-004 states that the
2 transmission operator shall operate within the Interconnection
3 Reliability Operating Limits ("IROLs") and System Operating Limits
4 ("SOLs"). It further requires that the transmission operator shall
5 operate so that the most severe single contingency will not result in
6 instability, uncontrolled separation, or cascading outages. It also
7 requires that if the system enters an "unknown operating state," as
8 referenced in TOP-004, the situation will be considered an emergency
9 and the transmission operator should return the system to "proven
10 reliable power system limits" within 30 minutes. TOP-007 requires
11 that when a contingency or other event results in an IROL violation,
12 the transmission operator shall return the operation of its
13 transmission system to within IROL limits as soon as possible, but no
14 longer than 30 minutes. The BES is planned and designed so that in
15 most conditions on the BES, the electric system will stay within
16 established IROLs and SOLs while supporting a substantial number of
17 economically driven transactions of electrical energy. Typically,
18 wholesale purchases of electric energy are made of the lowest cost
19 energy available and this energy is moved through the system while
20 transmission operators are able to keep system voltage levels, thermal

³ [http://www.nerc.com/_layouts/PrintStandard.aspx?standardnumber=TOP-007-0&title=Reporting System Operating Limit \(SOL\) and Interconnection Reliability Operating Limit \(IROL\) Violations&jurisdiction=United States](http://www.nerc.com/_layouts/PrintStandard.aspx?standardnumber=TOP-007-0&title=Reporting%20System%20Operating%20Limit%20(SOL)%20and%20Interconnection%20Reliability%20Operating%20Limit%20(IROL)%20Violations&jurisdiction=United%20States) (last visited July 18, 2013).

1 operating limits, and transmission corridor loadings at or below the
2 established IROLs and SOLs. In a limited number of cases, however,
3 there is not an ability to import the lowest cost energy and still stay
4 within these limits. In certain situations, running a specific unit may
5 be determined as the only way to maintain the system within the
6 accepted limits while serving all load within the constrained areas –
7 even if that specific unit is more expensive than other options. In such
8 cases, the unit is established as a must-run generator. At MISO, such
9 units are known as SSR units and must go through the SSR process
10 set forth in the MISO OATT Attachment Y-2.

11 **Q. What is meant by the most severe single contingency and how**
12 **does that impact this situation?**

13 A. A “contingency” is the loss of equipment from the electric system. An
14 element is lost when it is no longer in an energized state and providing
15 support for the BES. Elements include transmission lines,
16 transformers, generators, buses and other similar equipment.
17 Contingencies are also referred to as an “N-1” condition, where “N”
18 represents the total number of all pieces of equipment on the system
19 and “N-1” represents the loss of any one of those items. When a
20 contingency occurs, the rest of the electric system must support the use
21 of load and generation on the system in the absence of that equipment.
22 For example, if a transmission line is lost, electricity shifts to other

1 remaining lines on the system. If generation is lost, other generation
2 must make up for the lost power and provide voltage support to
3 maintain the integrity of the system, or load must be curtailed to
4 restore the system to proven reliable power system limits. A single
5 contingency is the loss of one piece of equipment. The most severe
6 single contingency is the loss of the one specific piece of equipment that
7 puts the most stress on the remaining equipment in the system. In the
8 transmission line example, the electricity that shifts to other energized
9 elements on the system may result in loadings that exceed the
10 operating limits of the equipment. For this example, the loss of a
11 specific transmission line that causes the greatest overload on any
12 other transmission line would be considered the most severe single
13 contingency. Contingencies can also impact the voltage of the system
14 and the most severe single contingency could also negatively impact
15 voltage levels. Regardless of the nature of the contingency, the system
16 still should operate within equipment thermal limits and accepted
17 system voltage levels after the contingency occurs. If such limits are
18 identified as an IROL, then TOP-007 requires that even under the
19 most severe single contingency, the system operator must be able to
20 return the system to within the established IROL. If such a situation
21 results in an unknown operating state, then TOP-004 requires that
22 even under the most severe single contingency, the system must be

1 able to return to proven reliable power system limits within 30
2 minutes. In some cases, there may be a limited set of options to
3 manage these overloads – such as either shedding load to reduce flows
4 on the overloaded transmission lines or turning on a limited set of
5 generators that have the ability to “push back” against these overloads
6 and reduce the flows to within accepted limits. If the required unit is
7 not able to be started and loaded as needed in sufficient time to
8 address the overloads, and unless alternative arrangements or actions
9 are not available to address the overload, then the unit will be
10 designated as a must-run generator and kept on-line to support the
11 system in case of specific contingencies.

12 **Q. How are these situations impacted by maintenance activities?**

13 A. Transmission maintenance is typically performed de-energized. This
14 results in taking equipment out of service and creating a clearance
15 zone for the repair crews to perform the maintenance work. From a
16 TOP-004 and TOP-007 perspective, this means that system operators
17 must operate the system without this element during the maintenance
18 activity such that the BES stays within established IROLs and SOLs.
19 Further, with this element out of service, the system must be operated
20 such that even under the most severe single *NEXT* contingency, the
21 transmission operator must return the BES to within the established
22 IROLs as soon as possible and no longer than 30 minutes. Because the

1 starting point during the line outage is already an N-1 condition, the
2 next contingency is effectively an N-1-1 state – the loss of two pieces of
3 equipment on the system. During de-energized maintenance, must-
4 run generation requirements may have to be increased or system load
5 either shifted or curtailed to ensure that the system is operated such
6 that it satisfies the TOP-004 and TOP-007 standards.

7 **Q. How do the TOP-004 and TOP-007 requirements relate to**
8 **operation of Coleman?**

9 A. It is my understanding that, while Century Aluminum is purchasing
10 electricity from Kenergy under its current contract, Big Rivers, as the
11 wholesale supplier to Kenergy, relies on Coleman to supply energy to
12 Kenergy and, in turn, to Century. With the expiration of that contract,
13 Coleman may not be needed for energy and capacity. Accordingly, Big
14 Rivers notified MISO that Big Rivers intends to suspend operation of
15 Coleman. Big Rivers' notification triggered a MISO review to
16 determine whether Coleman may be needed for reliability reasons and,
17 thus, be designated as an SSR. MISO is likely to determine that, in
18 the absence of an agreed upon and implemented mitigation plan,
19 Coleman still needs to be on-line to satisfy NERC TOP standards when
20 Century Aluminum is operating the Hawesville Smelter at full load. I
21 have not received MISO's final Attachment Y report as of the date of

1 this testimony. If and when I receive MISO's final Attachment Y
2 report, I will update my testimony as necessary.

3 **Q. How could the use of energized maintenance techniques**
4 **alleviate the need for SSR status for Coleman?**

5 A. The request to use energized maintenance techniques should be
6 considered as part of a package of actions that constitute the
7 mitigation plan that would alleviate the need for SSR status for
8 Coleman. It is my understanding that the mitigation plan currently
9 being discussed includes Century's installation of capacitors at the
10 Hawesville Smelter, the establishment of a protective relay scheme to
11 automatically reduce load at the Century Aluminum facility for loss of
12 any of the three lines identified above and the use of energized
13 maintenance techniques when maintenance is performed on those
14 facilities. As part of the mitigation plan, energized maintenance would
15 be used, when possible, to avoid creating contingencies on the system
16 that may require curtailment of the Century load below desired
17 production levels. The use of energized maintenance techniques will
18 keep the equipment fully operational during maintenance and would
19 establish a more 'robust' operating point during system operations. In
20 other words, with the use of energized maintenance, the operating
21 state of the system is "N" and not "N-1" during the maintenance

1 period. The effect, obviously, is that the next contingency would then
2 be N-1 instead of N-1-1.

3 **Q. Could the use of energized maintenance techniques, combined**
4 **with other measures, satisfy NERC reliability standards with**
5 **Coleman operation suspended?**

6 A. Yes. Based upon the information provided to me by Century
7 Aluminum, in my opinion a robust mitigation plan including the use of
8 energized maintenance, combined with capacitors and protective relay
9 arrangements, would alleviate the need to run Coleman and still
10 provide a reasonable economic opportunity to maintain operations at
11 the Hawesville Smelter, and NERC reliability standards will be
12 satisfied.

13 **Q. Can you cite examples where energized maintenance has been**
14 **approved by regional operators such as MISO?**

15 A. Yes, there are two well publicized examples that involved regional
16 operators in the decision to utilize energized maintenance techniques
17 on major transmission maintenance projects. The first example is the
18 345 kV LaCygne to Stillwell project. This project was performed in
19 2003 and involved reconductoring the existing 345 kV LaCygne to
20 Stillwell line while the line was energized. The need to do this project
21 energized was created by the difficulty in getting Southwest Power
22 Pool ("SPP") approval for an extended outage of the line to do the

1 reconductoring due to extensive congestion in the area. Kansas City
2 Power & Light (“KCPL”) worked with SPP and its members to get
3 agreement to perform the reconductoring energized and to recover the
4 extra cost through cost-sharing by the SPP members. The project was
5 completed ahead of schedule and without incident. The project was
6 documented in an article in the September 2003 issue of Transmission
7 and Distribution World magazine. The second example is the on-going
8 project by AEP to reinforce the transmission grid to the Lower Rio
9 Grande Valley in Texas. That portion of the system is served by two
10 single-circuit 345 kV lines. Load growth and generation retirements
11 have put strain on those lines and a plan was developed by AEP which
12 was approved by ERCOT to improve access into this portion of their
13 system. Due to difficulties in scheduling outages for a needed
14 reconductor that was part of that plan, ERCOT granted approval to
15 perform the reconductor energized. This project was documented in
16 the May 2013 issue of Transmission and Distribution World magazine.

17 **Q. Are you familiar with any other situations similar to the**
18 **situation involving Century Aluminum?**

19 **A.** Yes. Rio Tinto Alcan’s smelting operation in Kitimat, British
20 Columbia uses energized maintenance practices to maintain the
21 transmission lines that feed their smelting facilities. Allteck Line
22 Contractors, another Quanta Services company, provides energized

1 maintenance for Rio Tinto through an arrangement that has been in
2 place for about 5 years. During that time, Allteck has used energized
3 maintenance techniques safely and successfully for replacing damaged
4 insulators on those lines.

5 **Q. What objections to energized maintenance are typically raised,
6 and what is your response to these objections?**

7 A. The objections to energized maintenance practices are usually concerns
8 over safety and uncertainty on cost recovery of the extra expense.
9 With respect to safety, those concerns are addressed by engaging
10 highly qualified, well trained, experienced contractors that understand
11 the technical aspects of energized projects and have developed detailed
12 work practices and acquired appropriate, well maintained tools to
13 address the working conditions on energized equipment. With respect
14 to cost recovery, it is a legitimate concern. Energized maintenance
15 techniques are typically more expensive than de-energized techniques.
16 The beneficiaries of energized construction are users of the electric
17 system and market participants who would avoid having to pay
18 congestion rents related to constraints created during maintenance
19 outages. However, in today's markets, there is no clearly established
20 method to align the extra cost of energized maintenance with those

1 who benefit from it. While certain project exceptions exist,⁴ usually
2 the extra cost burden falls on the transmission owner. In such cases,
3 the transmission owner will often make the economic decision to use
4 the practice that minimizes the costs to the transmission owner – even
5 if the incremental cost of performing the work energized is
6 substantially less than the energy cost savings in the impacted energy
7 market that would have resulted from performing the work energized.
8 It is my opinion that once cost allocation methods recognize the value
9 of energized maintenance practices in reducing congestion in energy
10 markets, then energized maintenance techniques will become more
11 widely utilized than they are today.

12 **Q. Do any of these potential objections apply to Century's**
13 **proposal for energized maintenance?**

14 **A.** Based upon my current understanding of the situation – no, these
15 concerns should not apply. If Big Rivers utilizes experienced
16 contractors with well trained staff in energized work practices who use
17 appropriate, well maintained tools and have extensive energized
18 project experience, they will have acted prudently to address safety
19 concerns. Also, Century has indicated they will cover the extra cost of
20 performing maintenance energized versus de-energized. Therefore,

⁴ In the LaCygne to Stillwell reconductor example quoted above, SPP and its members recognized the value of performing the project live and agreed to recover the extra costs across the membership.

1 there should be no cost recovery issue for Big Rivers in dealing with
2 the extra cost of energized maintenance techniques.


3 **Q. Does this conclude your testimony?**

4 **A. Yes.**

**JOINT APPLICATION OF KENERGY CORP. AND BIG RIVERS
ELECTRIC CORPORATION FOR APPROVAL OF CONTRACTS AND
FOR A DECLARATORY ORDER
CASE NO. 2013-00221**


VERIFICATION

I, Donald J. Morrow, verify, state, and affirm that I prepared or supervised the preparation of the Direct Testimony filed with this Verification, and that such Direct Testimony is true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.


Donald J. Morrow

STATE OF NORTH CAROLINA)
COUNTY OF WAKE)

SUBSCRIBED AND SWORN TO before me by Donald J. Morrow on
this the 17th day of July, 2013.


Notary Public
My Commission Expires 4-22-2017

**SHEILA S. MOORE
NOTARY PUBLIC
WAKE COUNTY, N.C.
My Commission Expires 4-22-2017.**



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2

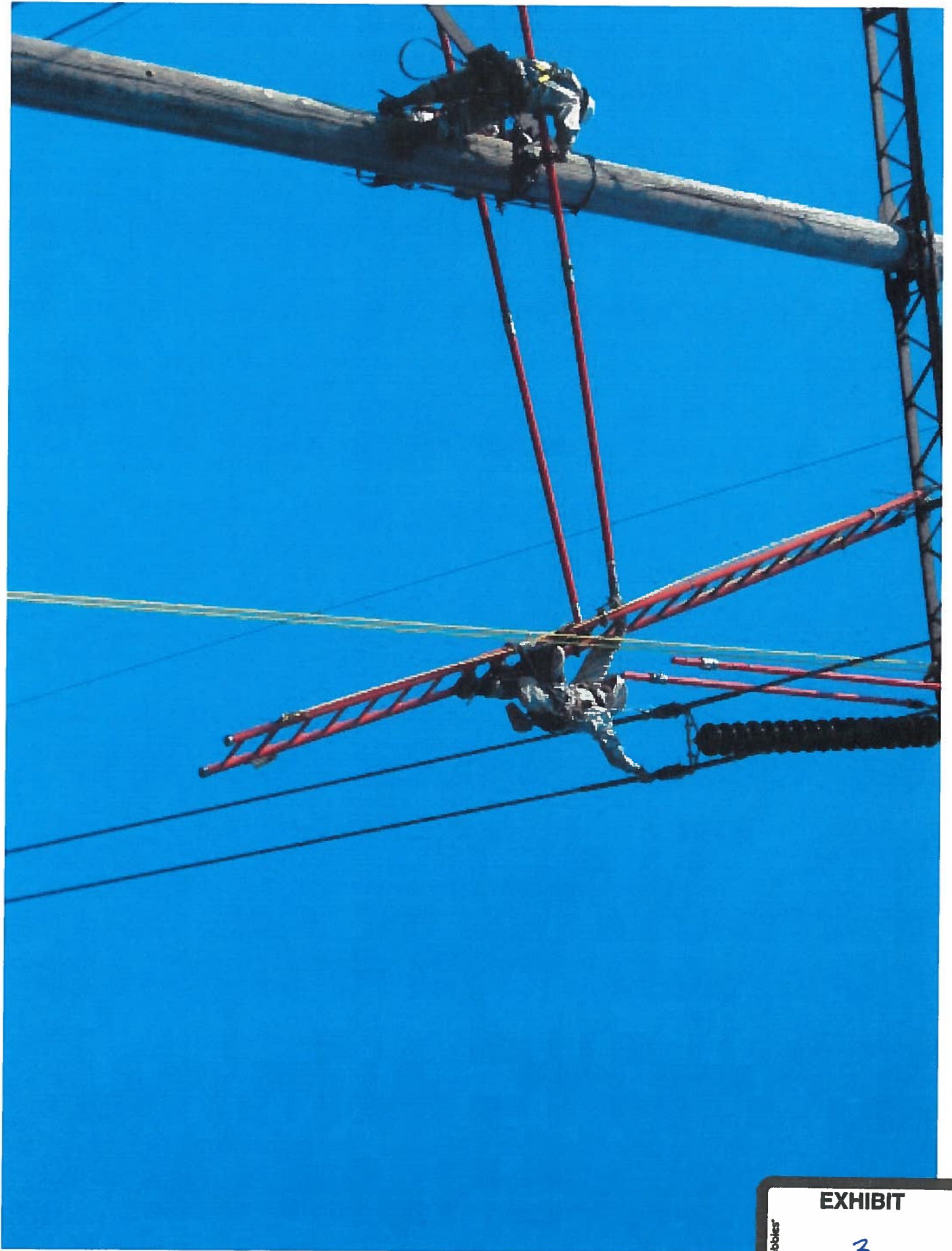


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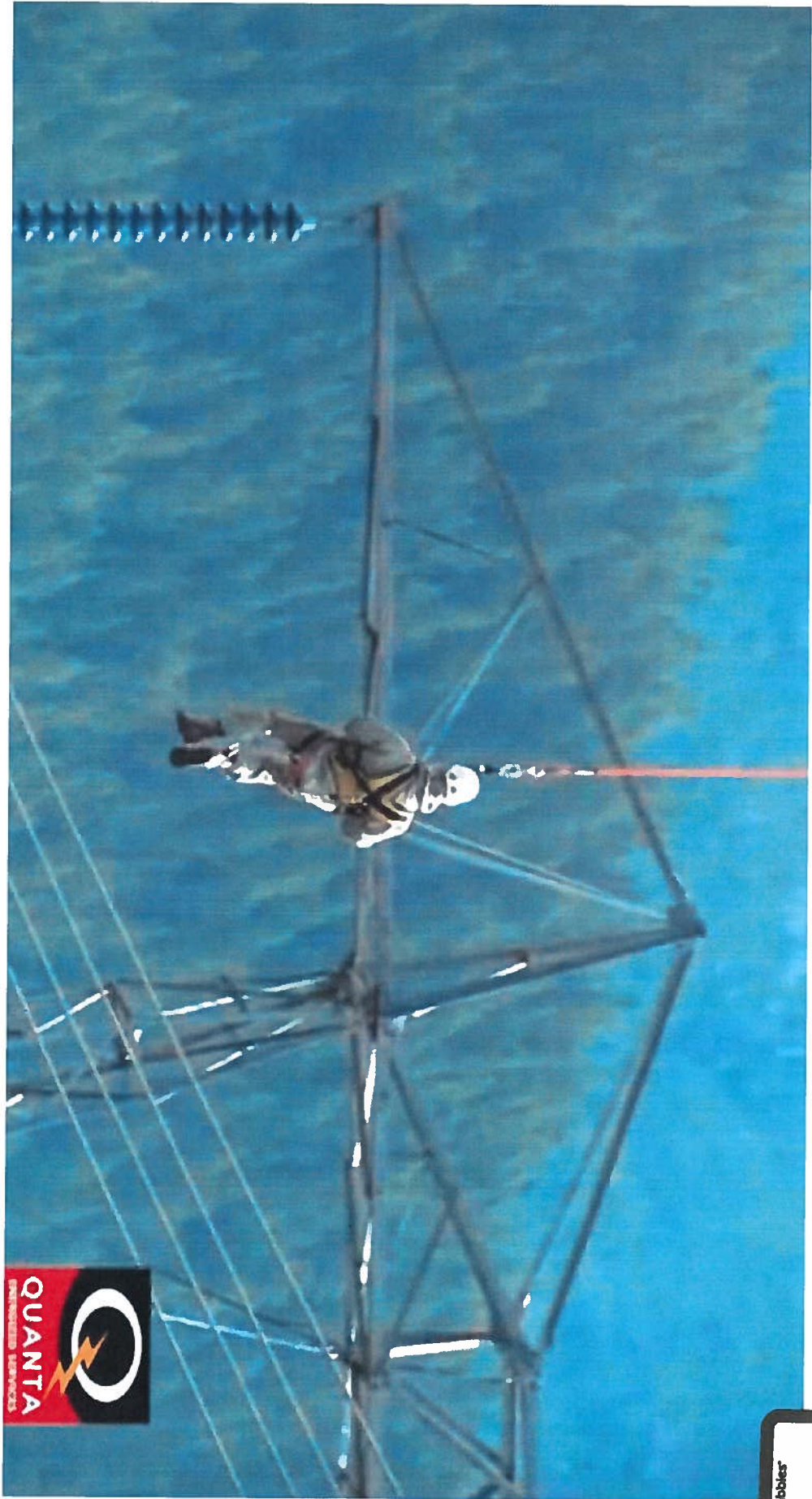


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JUL 19 2013

PUBLIC SERVICE
COMMISSION

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

Joint Application of Kenergy Corp.)
and Big Rivers Electric Corporation)
for Approval of Contracts and for) Case No. 2013-00221
A Declaratory Order)

DIRECT TESTIMONY

OF

**SEAN BYRNE
PLANT MANAGER - HAWESVILLE SMELTER**

ON BEHALF OF

CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

FILED: July 19, 2013

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4

**DIRECT TESTIMONY
OF
SEAN BYRNE**

5 **Q. Please state your name, business address, and position.**

6 A. My name is Sean Byrne. I am employed by Century Aluminum of
7 Kentucky General Partnership ("Century") as Plant Manager for the
8 Hawesville, Kentucky Smelter ("Hawesville Smelter"). My business
9 address is: 1627 State Hwy 271 N, Hawesville, KY 42348. I have held
10 this position since November 2012. Prior to that, I was the
11 Manufacturing Manager for the Hawesville Smelter. Prior to coming
12 to work for Century, I was employed by Alcoa for 8 years and Toyota
13 for 13 years.

14 **Q. What is the purpose of your testimony?**

15 A. The purpose of my testimony is to provide an overview of the
16 Hawesville Smelter; discuss the economic impact of the Hawesville
17 Smelter on the region and the Commonwealth; explain the importance
18 to the Hawesville Smelter of the power procurement and supply
19 transactions at issue in this case (the "Century Transaction"); and
20 explain the critical importance of Commission approval of the Century
21 Transaction, without material changes, on or before August 19, 2013.

22 **Q. Please provide a brief overview of the Hawesville Smelter.**

23 A. The Hawesville Smelter is Century's largest U.S. plant, with a rated
24 production capacity of 244,000 metric tons per year. The Hawesville

1 Smelter is the only producer of high-purity aluminum in North
2 America. Four of the Hawesville Smelter's five potlines are specially
3 configured and operated to produce high-purity primary aluminum and
4 those potlines have an annual rated production capacity of
5 approximately 195,000 metric tons per year. The average purity level
6 of primary aluminum produced by these potlines is 99.9 percent,
7 compared to standard-purity aluminum, which is approximately 99.7
8 percent. Aluminum from the Hawesville Smelter supplies the
9 electrical conductor, remelt ingot and high-purity ingot markets, as
10 well as the defense and aerospace industries. A large portion of the
11 Hawesville Smelter's specially configured facility provides the high-
12 conductivity metal required by the Hawesville Smelter's largest
13 customer, Southwire, for its electrical wire, cable and certain aerospace
14 products. The high-purity product from the Hawesville Smelter also
15 supports the United States' national security efforts and is used in
16 defense applications such as the F-16 and naval war vessels. The
17 product is also used in the manufacture of Boeing 747 airplanes and in
18 the International Space Station.

19 **Q. What are the economic benefits provided by continued**
20 **operation of the Hawesville Smelter?**

21 A. The Hawesville Smelter provides significant economic benefits.
22 Century has 671 employees at the smelter. The average wages and

1 benefits for our employees is over \$90,000/year. A December 2011
2 independent study, which I am attaching as Exhibit 1, concluded that
3 the total annual direct and indirect wages were \$94.7 million. In
4 addition, Century pays \$850,000/year in property taxes and
5 contributes directly and indirectly almost \$1.5 million in local taxes to
6 Hancock County. The total economic impact of Century's operations is
7 almost \$840 million/year. The two aluminum smelters in Kentucky –
8 the Hawesville Smelter and the smelter in Sebree, Kentucky that
9 Century recently purchased from Rio Tinto Alcan - together make
10 Kentucky the #1 state in the country in terms of aluminum production.
11 Aluminum is important to Kentucky manufacturing and, in particular,
12 to the auto industry. In addition, the Southwire Cable plant, which is
13 adjacent to the Hawesville Smelter and employs almost 400, takes
14 metal directly from the Hawesville Smelter and is dependent on the
15 continued operation of the Hawesville Smelter. I am attaching as
16 Exhibit 2 a letter dated June 26, 2012, from Southwire to Governor
17 Beshear, explaining the benefits for continued aluminum
18 manufacturing in Kentucky.

19 **Q. How important are electricity costs to the operation of the**
20 **Hawesville Smelter?**

21 **A.** Electricity costs are the largest production cost at the Hawesville
22 Smelter, representing approximately 40% of the cost to manufacture

1 aluminum. The Hawesville Smelter uses about 345 million KWh per
2 month or as much as about 265,000 homes. The Hawesville Smelter's
3 electricity bill is approximately \$17 million a month at the current
4 power rate.

5 **Q. How do the Hawesville Smelter's current electricity costs**
6 **compare to electricity costs for other smelters against which**
7 **the Hawesville Smelter competes?**

8 A. At the outset, I must make clear that the Hawesville Smelter faces
9 significant and persistent global competition. Our product —
10 aluminum — is a commodity that is traded in world-wide markets.
11 Therefore, the Hawesville Smelter has no ability to raise the price for
12 its product. To be competitive, the Hawesville Smelter must manage
13 its production costs. The primary raw material — alumina — is also a
14 commodity traded on world-wide markets. Even after reducing all
15 other non-power costs, the Hawesville Smelter cannot survive at the
16 current power prices. The Hawesville Smelter's current average rate is
17 about \$49/MWh and, even before Century gave its notice of
18 termination, was projected to increase in the near-term to
19 approximately \$60/MWh. A \$60/MWh power rate is about 80% higher
20 than the world average power rate to aluminum smelters and 30%
21 higher than the rate paid by other aluminum smelters in the United
22 States. After exhausting other efforts at rate relief, the Hawesville

1 Smelter had no choice but to give notice on August 20, 2012 to
2 terminate its power contract effective August 20, 2013 due to high
3 power costs. As explained in Mr. Early's testimony, Century continued
4 to pursue options, legislatively and otherwise, in an effort to continue
5 production at the Hawesville Smelter beyond August 19, 2013.
6 Fortunately, those additional efforts resulted in the Century
7 Transaction. This electric service arrangement will provide the
8 Hawesville Smelter an opportunity to purchase power at prices that, at
9 current levels, will be capable of sustaining operations at the
10 Hawesville Smelter for the foreseeable future, provided Century is
11 allowed to deliver sufficient power to serve its entire load. Current
12 prices for electricity in the competitive market are about 30% lower
13 than the power rates that the smelters pay today.

14 **Q. What will happen if the Commission either materially modifies**
15 **the Century Transaction adversely, or rejects the Century**
16 **Transaction?**

17 A. I would prefer not to have to be this direct, but operating under the
18 Century Transaction as it has been submitted to the Commission or
19 closing the Hawesville Smelter are the only two options remaining for
20 Century. To be absolutely clear, I want to emphasize that there will be
21 no second chance for the Hawesville Smelter. If the Century
22 Transaction is not approved, the Hawesville Smelter will cease

1 operations on August 20, 2013 and, once operations cease, the
2 Hawesville Smelter will, very likely, never reopen. Century's
3 employees will lose their jobs causing an immediate impact on their
4 families, the communities in which they live, and the economy in
5 western Kentucky. The United Steelworkers ("USW"), which
6 represents more than 500 employees at the Hawesville Smelter
7 understands the critical need for timely Commission approval of the
8 Century Transaction. I am attaching as Exhibit 3 a letter from the
9 USW expressing its and the AFL-CIO's full support for prompt
10 Commission approval of the Century Transactions as necessary for the
11 continued employment of its members.

12 **Q. Can you explain why the August 19, 2013 deadline for**
13 **Commission approval is so critical?**

14 A. While aluminum smelters can sustain limited-duration curtailments,
15 any shut-down lasting more than 3 hours would cause the molten
16 aluminum to harden in the smelter's potlines. Once the aluminum
17 hardens or "freezes," a substantial capital investment must occur to
18 return the potlines to full operation. Century estimates that, if the
19 Hawesville Smelter ceases operations, an investment of nearly \$100
20 million would be required to restart the plant. In a globally
21 competitive industry where margins are extremely thin, a capital
22 investment of this magnitude is not recoverable. Therefore, the

1 practical economic reality is that, if operations cease at the Hawesville
2 Smelter, it will, very likely, never reopen.

3 **Q. Does this conclude your testimony?**

4 **A. Yes.**

JOINT APPLICATION OF KENERGY CORP. AND BIG RIVERS
ELECTRIC CORPORATION FOR APPROVAL OF CONTRACTS AND
FOR A DECLARATORY ORDER
CASE NO. 2013-00221


VERIFICATION

I, Sean Byrne, verify, state, and affirm that I prepared or supervised the preparation of the Direct Testimony filed with this Verification, and that such Direct Testimony is true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.


Sean Byrne

COMMONWEALTH OF KENTUCKY)
COUNTY OF HANCOCK)

17th SUBSCRIBED AND SWORN TO before me by Sean Byrne on this the
day of July, 2013.


Notary Public, Ky. State at Large
My Commission Expires 1-22-2014

Economic Impact Analysis

Prepared for

| Century Aluminum

Economic Impact Analysis
of the Operations of Century Aluminum
on the Hancock County Economy

December 2011





Economic Impact Analysis: Century Aluminum

Introduction

Younger Associates was retained to conduct an economic impact analysis of the current operations of Century Aluminum located in Hawesville, Hancock County, Kentucky.

Younger Associates is a private market research and economic development consulting firm located in Jackson, Tennessee. The company has been performing economic impact analyses for public and private entities since 1990.

Younger Associates' economic impact calculation methodology has been applied in hundreds of projects across the United States over the past 20 years. The firm's methodology is recognized by the International Economic Development Council and utilized in courses by the Economic Development Institute. Over the years, the Younger Associates' approach has proven to be highly accurate although slightly conservative in projecting tax revenue generation.

Scope and Purpose of Study

This study is designed to quantify the impact of Century Aluminum's operations in Hancock County Kentucky. In this study, economic impact is measured in terms of dollar value of total economic output, jobs, wages and local tax revenues generated as a result of the business activities related to Century Aluminum's operations.

From this study, one can gain a systematic understanding of the dollar and employment economic impact that Century Aluminum's operations and investments have upon the local economy.

The purpose of this study is to provide local policy makers with an understanding of the economic significance of Century Aluminum's operations. This analysis measures the overall impact of current operations in Cheatham County.

Methodology

The economic impact calculations in this study were generated using an economic model based on regional economic data and regional input-output multipliers (RIMS II) from the U.S. Bureau of Economic Analysis. The RIMS II multipliers are developed based on historic economic activity generated at the county level for 406 industry sectors. RIMS II provides six types of multipliers for each industry sector: final-demand multipliers for output, earnings, employment and value added; and direct-effect multipliers for earnings and employment.

The RIMS II multipliers account for inter-industry relationships within regions comprised of one or more counties. They are widely used in both the public and private sectors. They were originally developed to estimate the regional impacts of military base closings and airport construction. The multipliers eliminate the need for surveys, which can introduce bias into the data.

Primary data regarding employment, facilities, operations and expenditures was provided by Century Aluminum. The specific information provided includes current annual operating revenues, capital investments, number of employees and wages paid.

Additional secondary data was collected by Younger Associates for this analysis from the U.S. Department of Labor, Bureau of Labor Statistics, the U.S. Bureau of Economic Analysis, the U.S. Department of Revenue and the State of Kentucky Departments of Revenue and Workforce Development. Proprietary licensed data from Claritas was utilized in this study to support the data collected from other sources.

Impact Definitions:

Annual Economic Impact – the total dollar value of change in output from all industries, within the local economy, that results from \$1 of change in output from Century Aluminum

Indirect Jobs – the number of jobs in all industries in the local economy other than Century Aluminum and its suppliers that are supported by ongoing operations and employees. This could include jobs (or hours of work which comprise portions of jobs) of vendors, business services, retail, personal services, transportation and all other industries.

Findings: Economic Impact of Century Aluminum Operations in Hancock County

Annual Economic Impact

Economic Impact is the total change in output by all industries as a result of Century Aluminum's operations. In addition to the daily operations of Century Aluminum, there are other related activities that generate impact on the region.

Century Aluminum has a projected annual operating budget of \$613.6 million. Their operations generate an economic impact of \$836.8 million that flow through the Hancock County economy annually.

Each year, Century Aluminum also makes significant capital investments in their facility and property. In this analysis, an average of the annual capital investments over a three-year period was used to determine the typical impact of Century Aluminum capital investments per year. The annual average economic impact generated from these improvements is \$1.6 million.

The combined impact on the Hancock County economy from Century Aluminum's operation is \$838.5 million annually. The chart below shows the impact of the operations on the Hancock County economy.

	Economic Impact
Operations	\$836,831,626
Capital Spending	\$1,635,210
Total Economic Impact	\$838,466,836

The total economic impact includes wages paid to direct and indirect jobs supported by their operations, local spending, capital investments and taxes generated. Each of these areas are examined in further detail as a part of this study. However, it should be noted, while they are examined separately, they are already included in the total economic impact of Century Aluminum.

Job Creation and Wage Impact

Century Aluminum directly employs 771 workers at their Hawesville, Kentucky facility, which houses smelting, rolling and reduction operations. Much of the economic impact of Century Aluminum on Hancock County is generated by the direct payment of wages to employees and the jobs and wages that are created by both company spending and employee spending.

Across all industries, another 474 workers are employed in Hancock County due to the economic activity related to the ongoing operations and the annual capital investments of Century Aluminum. These indirect jobs include jobs that exist throughout the local economy at companies that supply products and services to Century Aluminum, as well as at companies, such as retailers and personal service providers, that support consumer spending by Century Aluminum employees.

The annual wages paid to the total 1,245 workers (direct and indirect) is projected to be \$94.9 million. The table below summarizes the direct and indirect jobs supported and direct and indirect wages in the local economy from the ongoing operations of Century Aluminum.

	Operations	Capital Spending	Total
Direct Jobs	771	0	771
Indirect Jobs	470	4	474
Total Jobs	1,241	4	1,245
Direct Wages & Benefits	\$68,171,324	0	\$68,171,324
Indirect Wages	\$26,531,901	\$233,662	\$26,765,563
Total Wages	\$94,703,225	\$233,662	\$94,936,887

Local Tax Revenues

Tax revenues examined in this study include local property taxes paid directly by Century Aluminum, local property taxes generated indirectly by company operations and local sales tax by employee spending. Local occupational taxes that are generated by wages paid to Century Aluminum employees were also examined. State and federal taxes are not included in this study.

Local property taxes paid directly by Century Aluminum during the most recent fiscal year total \$825,000. In addition, local tax revenues realized by Hancock County, generated indirectly by the operations of Century Aluminum, are \$1.5 million, bringing the total local tax revenue impact to \$2.3 million annually.

Consumer Spending

The consumer expenditures generated as a result of Century Aluminum's economic activity is also examined in this study. Spending is identified by major retail and service categories, which totals \$71.4 million annually in Hancock County. A complete breakdown by category for Hancock County is included in this report.

Other Local Factors

While the overall economic impact of Century Aluminum's operations includes the direct and indirect wages, taxes and consumer spending, it is important to note some other local factors included within the total impact. Century Aluminum spends \$35,000 with the City of Hawesville for its water and sewer services. Other utilities, such as electricity and natural gas, paid to regional sources, total \$220 million annually. The consumption of utilities and the rates paid by Century Aluminum help to offset the rates to residential customers.

Century Aluminum also impacts the local economy by contributing to local charities and non-profit organizations that provide essential services to the community. Annually, Century Aluminum contributes over \$20,000 to non-profit and charitable organizations in Hancock County.

Century Aluminum Hawesville, Hancock County, KY

Economic Impact from Operations

Operations Impact	Total
Total Operating Budget	\$ 613,647,889
Final Demand Output Multiplier ¹	1.3637
Total Economic Impact	\$ 836,831,626

Century Aluminum Hawesville, Hancock County, KY

Economic Impact from Operations

Wage Impact	Total
Employment, Direct	771
Wages & Benefits, Direct ²	68,171,324
Direct Effect Employment Multiplier ³	1.6091
Employment, Indirect	470
Total Employment	1,241
Hancock County Annual Average Wage ⁴	\$ 56,497
Wages, Indirect	\$ 26,531,901
Total Wages	\$ 94,703,225
Hancock County Occupational Tax from Direct Wages ²	\$ 681,765
Hancock County Occupational Tax from Indirect Wages (1.25%)	\$ 331,649
Total Occupational Tax	\$ 1,013,414
Hancock County Property Tax - Indirect ⁵	\$ 475,884
Total Local Taxes	\$ 1,489,298

Century Aluminum Hawesville, Hancock County, KY

Economic Impact from Capital Investment

	2009	2010	YTD 2011	Three-Year Average
Total Capital Investment	\$ 1,281,000	\$ 707,209	\$ 2,557,655	\$ 1,515,288
Building And Site Work	\$ 101,000	\$ 227,496	\$ 1,049,492	\$ 459,329
Final Demand Output Multiplier - Construction ⁶	1.1151	1.1151	1.1151	
Economic Impact	\$ 112,625	\$ 253,681	\$ 1,170,289	\$ 512,198
Equipment Purchase/Set-up	\$ 1,180,000	\$ 479,713	\$ 1,508,163	\$ 1,055,959
Final Demand Output Multiplier - Wholesale Trade ⁷	1.0635	1.0635	1.0635	
Economic Impact	\$ 1,254,930	\$ 510,175	\$ 1,603,931	\$ 1,123,012
Total Economic Impact	\$ 1,367,555	\$ 763,856	\$ 2,774,220	\$ 1,635,210
Final Demand Employment Multiplier - Construction ⁸				4.9596
Jobs Supported From Construction/Improvements				2
Final Demand Employment Multiplier - Wholesale Trade ⁹				1.7593
Jobs Supported from Equipment Purchase/Set-Up				2
Total Jobs Supported Annually from Capital Investment				4
Hancock County Annual Average Wage ⁴				\$ 56,497
Wages, Indirect				\$ 233,662
Hancock County Occupation Tax (1.25%)				\$ 2,921
Hancock County Property Tax - Indirect ⁵				\$ 2,553

**Hancock County, KY
Consumer Spending¹⁰ from Wages**

Spending Category	Total
Total Wages	\$ 94,936,887
After taxes & savings:	\$ 71,392,539
	Annual %
Housing/Shelter	18.4% \$ 13,136,227
Transportation (vehicle, gas, maintenance)	17.2% \$ 12,279,517
Personal Insurance	10.8% \$ 7,710,394
Utilities	8.7% \$ 6,211,151
Groceries	7.5% \$ 5,354,440
Health Care	6.9% \$ 4,926,085
Entertainment	5.3% \$ 3,783,805
Restaurants	5.1% \$ 3,641,019
Charity	3.7% \$ 2,641,524
Housekeeping Supplies/Services	3.5% \$ 2,498,739
Apparel	3.4% \$ 2,427,346
Household Furnishings/Equipment	3.2% \$ 2,284,561
Education/Reading	1.8% \$ 1,285,066
Miscellaneous	1.6% \$ 1,142,281
Alcohol/Tobacco	1.6% \$ 1,142,281
Personal Care Products/Services	1.3% \$ 928,103
	100.0% \$ 71,392,539

**Century Aluminum
Hawesville, Hancock County, KY
Economic Impact**

Local Factors to Be Considered

Annual Local Property Taxes paid to City of Hawesville/Hancock County	\$	825,000
Utilities and Utility Fees Paid to City of Hawesville/Hancock County	\$	35,000
Local Donations to Charitable Organizations	\$	20,000

Notes for Century Aluminum Economic Impact Analysis:

1. U.S. Bureau of Economic Analysis, RIMS II final-demand output multiplier for Hancock County, Kentucky for alumina refining and primary aluminum production.
2. Wage and occupational tax data provided by Century Aluminum.
3. U.S. Bureau of Economic Analysis, RIMS II, aggregate direct effect employment multiplier for Hancock County, KY: number of indirect jobs created per direct job multiplier for alumina refining and primary aluminum production.
4. U.S. Department of Labor, Bureau of Labor Statistics, Annual Average Wage/Salary for all industries in Hancock County, 2010 plus an assumed 3.5% average wage increase for 2011.
5. Based upon U.S. Census. Bureau Data historical trend data for new property value created within Hancock County per each new job created in the local workforce. The new property value created may represent new single-family homes, new rental property, commercial property, or expansions or improvements to existing property. Although commercial property value is included, the residential rate of assessment is used as a conservative measure. Tax revenue calculated based upon the Hancock County tax rate of \$0.007545. For the purpose of this analysis the property tax rates for the cities of Hawesville or Lewisport were not considered.
6. U.S. Bureau of Economic Analysis, RIMS II final-demand output multiplier for Hancock County, Kentucky for construction.
7. U.S. Bureau of Economic Analysis, RIMS II final-demand output multiplier for Hancock County, Kentucky for wholesale trade.
8. U.S. Bureau of Economic Analysis, RIMS II final demand employment multiplier for Hancock County, Kentucky – number of indirect jobs created per million dollar of output of construction.
9. U.S. Bureau of Economic Analysis, RIMS II final demand employment multiplier for Hancock County, Kentucky – number of indirect jobs created per million dollar of output of wholesale trade.
10. Consumer expenditure projections are based upon the U.S. Department of Labor Bureau of Labor and Statistics 2010 Annual Consumer Expenditure Survey, Southern United States.

*All calculations are in 2011 constant dollars.

Southwire Company
One Southwire Drive
Carrollton, GA 30119
Tel. (770) 832-4499
Fax (770) 832-5560
www.southwire.com



June 26, 2012

VIA FEDERAL EXPRESS

Governor Steve Beshear
700 Capitol Avenue, Suite 100
Frankfort, Kentucky 40601

Re: Century Aluminum

Dear Governor Beshear:

As you may know, Southwire Company ("Southwire") is a leading North American supplier of electrical power cables to investor-owned utilities, municipalities, co-ops, electrical distributors, and large box retailers. Although Southwire is headquartered in Carrollton, Georgia, the company maintains and operates significant assets in Hawesville, Kentucky.

Southwire currently employs 396 workers at its Hawesville facility, which covers 410,000 square feet of manufacturing floor space. Included within this space are three aluminum rod mills (the "Kentucky Rod Mills"), a cable plant, and an aluminum strip plant.

Our understanding is that Century Aluminum Kentucky ("Century") has contacted you to express concern regarding the cost of electricity at Century's Hawesville aluminum smelting plant (the "Century Smelter"). Because Southwire was a joint partner at the Century Smelter from 1969 to 1990, and 100% owner of the Century Smelter between 1990 and 2000, we understand the sensitivity and importance of competitively priced electricity to help maintain the sustainable operation of the Century Smelter. Currently, Southwire has a multi-year molten (liquid) aluminum supply contract with Century pursuant to which Century supplies to Southwire the majority of the primary aluminum that Southwire requires to operate the Kentucky Rod Mills.

It is important to note that over 95% of the world's aluminum rod mills are located within close proximity of aluminum smelters where molten primary aluminum can be transferred from the smelter to the rod mills with relative ease and safety. This ready availability of molten aluminum benefits both smelters and rod mills. It is in Southwire's best interests for Century to maintain a viable and sustainable aluminum smelter, because the Century Smelter enables Southwire to obtain the molten aluminum necessary for Southwire to operate the Kentucky Rod Mills.



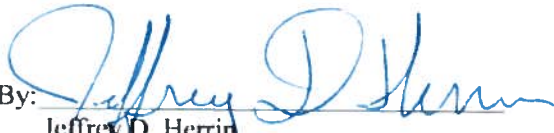
Southwire's Kentucky Rod Mills were designed and built with the expectation that an adjacent aluminum smelter would be present. If the Century Smelter's supply of molten aluminum were discontinued, Southwire itself would be forced to melt solid primary aluminum in order to maintain production at its Kentucky Rod Mills. This would, in effect, increase Southwire's cost to produce aluminum rod and effectively negate the benefits of locating and operating our Kentucky Rod Mills in Hawesville.

Southwire supports any efforts that can be implemented to provide Century with electricity rates that will enable Century to continue long-term operations at the Smelter and compete effectively with other aluminum smelters, not only in North America but also around the world. Further, Century's continued supply of molten aluminum to Southwire's Kentucky Rod Mills will help Southwire continue to produce at Hawesville while remaining competitive in global electrical wire and cable markets.

Southwire sincerely appreciates your time and your attention to this important matter.

Very truly yours,

SOUTHWIRE COMPANY

By: 
Jeffrey D. Herrin
Executive Vice-President, Operations



District 8

Ernest R. "Billy" Thompson
District Director
Alan Sampson
Assistant to the Director

July 17, 2013

Mr. Sean Byrne
Plant Manager
Century Aluminum
1627 State Hwy 271 N
Hawesville, KY 42348

Subject: USW Support for Century Transaction



Dear Mr. Byrne:

As you know, I serve as the Director of District 8 of the United Steelworkers ("USW"), which represents more than 500 employees at Century Aluminum's Hawesville, Kentucky Smelter. These employees live in several Kentucky counties, including in Hancock County where the Hawesville Smelter is located. The Hawesville Smelter provides jobs that allow our members to buy homes, raise their families, and send their kids to college. There are not many opportunities for these types of jobs in western Kentucky. The USW knows full well that if the Hawesville Smelter is forced to shut down, these jobs will be leaving Kentucky and will very likely not return.

While the Hawesville Smelter continues to operate, on April 16, 2013 Century issued a conditional notice to employees of Century's intent to cease plant operations on August 20, 2013 if the plant cannot secure a competitively priced power contract. The announcement was made pursuant to the federal Worker Adjustment and Retraining Notification Act ("WARN"). The company also gave conditional notice to terminate its supply contract with its largest customer, the Southwire Company, given the potential plant closure effective August 20.

While I am not familiar with every detail in the competitively priced power transaction that has been presented to the Kentucky Public Service Commission for review and approval, I understand that the transaction will enable the Hawesville Smelter to obtain market-priced electricity at a cost that is substantially lower than what it is paying under its current contract. I also understand that the lower power prices under the transaction are absolutely necessary for continued operations at the Hawesville Smelter and the continued employment of over 500 USW members. My understanding is that if the Commission approves the proposed transaction, Century will withdraw the WARN notice and will continue to operate the Hawesville Smelter.

The USW and the AFL-CIO fully support the proposed transaction that is pending before the Commission, which is necessary to maintain operations and continued employment at the Hawesville Smelter. The USW and AFL-CIO also fully support and appreciate Century's efforts to obtain Commission approval of the transaction, without modification, in sufficient time to avoid the shutdown of the Hawesville Smelter that will otherwise occur on August 20, 2013.

If you have any questions or need additional information, please contact me at your convenience.

Sincerely,

A handwritten signature in black ink that reads "Ernest R. Thompson". The signature is written in a cursive style with a long horizontal flourish at the end.

Ernest R. "Billy" Thompson
Director, District 8
United Steelworkers

RECEIVED

JUL 19 2013

PUBLIC SERVICE
COMMISSION

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

Joint Application of Kenergy Corp.)
and Big Rivers Electric Corporation)
for Approval of Contracts and for) Case No. 2013-00221
A Declaratory Order)

DIRECT TESTIMONY

OF

**MICHAEL EARLY
CORPORATE ENERGY DIRECTOR**

ON BEHALF OF

CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

FILED: July 19, 2013

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2
3
4

**DIRECT TESTIMONY
OF
MICHAEL EARLY**

5 **Q. Please state your name, business address, and position.**

6 A. My name is Michael Early. I am employed by Century Aluminum
7 Company, the parent of Century Aluminum of Kentucky General
8 Partnership ("Century"), as Corporate Energy Director. My
9 responsibilities include power management for the Hawesville,
10 Kentucky Smelter ("Hawesville Smelter"). My business address is:
11 1300 SW Fifth Avenue, Suite 1750, Portland Oregon 97201. I have
12 held this position since July 2011. Prior to that, I was Executive
13 Director of the Industrial Customers of Northwest Utilities for six
14 years after having represented the aluminum companies in the
15 Northwest for over 20 years.

16 **Q. What is the purpose of your testimony?**

17 A. My testimony:

- 18 1. Provides the context for the proposed contracts among Big
19 Rivers, Kenergy, and Century and addresses some of the critical
20 terms of these contracts and the importance of timely approval
21 of these contracts.
- 22 2. Provides the context for the on-going process being conducted by
23 the Midcontinent Independent System Operator, Inc. ("MISO")
24 in response to Big Rivers' request to suspend operation of the

1 Coleman generating units and addresses some of the critical
2 issues in that process.

3 3. Provides the context for Mr. Morrow's testimony on "live line"
4 maintenance and explains the critical role of such maintenance
5 for continued operation of the Hawesville Smelter.

6 **Q. Were you involved in negotiating the proposed contracts?**

7 A. Yes. I participated in the contract negotiations.

8 **Q. Please briefly identify and discuss the contracts.**

9 A. There are nine contracts:

10 Electric Service Agreement between Kenergy and Century. This
11 is the retail electric service agreement. Kenergy sells to Century the
12 energy acquired under Kenergy's wholesale electric service agreement
13 with Big Rivers at the cost to Kenergy plus a small fee. This includes
14 as an attachment the service contract for non-smelting load if the
15 smelting load is closed.

16 Arrangement and Procurement Agreement between Big Rivers
17 and Kenergy. This is the wholesale electric service agreement. Big
18 Rivers, acting as the MISO "market participant", acquires energy,
19 capacity, transmission, and ancillary services from the market at
20 MISO prices and resells to Kenergy at a pass-through rate.

21 Direct Agreement between Big Rivers and Century. This
22 provides for direct payment by Century of any Coleman costs under a

1 System Support Resource (“SSR”) Agreement and other costs incurred
2 by Big Rivers if Big Rivers is no longer the market participant and
3 these costs are not paid by Century under the Electric Service
4 Agreement.

5 Capacitor and Relay Agreements among Big Rivers, Kenergy,
6 and Century. These address the capacitor additions and relay systems
7 which must be installed to allow Century to operate at full capacity
8 when operation of the Coleman units is suspended.

9 Tax Indemnity Agreement between Kenergy, Century, and
10 Century Parent. Century and Century Parent indemnify Kenergy for
11 any costs if it loses its tax exempt status due to implementation of the
12 proposed contracts.

13 Guarantee among Big Rivers, Kenergy, and Century Parent;
14 Capacitor Additions and Protective Relays Guarantee among Big
15 Rivers, Kenergy and Century Parent; and Security and Lock Box
16 Agreement among Big Rivers, Kenergy, and Century, and Old
17 National Bank. Each of these agreements assures Kenergy and/or Big
18 Rivers that required payments by Century will be made and received.

19 **Q. Does Century support the Commission’s approval of those**
20 **contracts subject to its jurisdiction?**

21 A. Yes. The contracts are the product of extensive negotiations among
22 the parties. The contract structure achieves the common goal that any

1 net incremental costs incurred by Big Rivers or Kenergy in providing
2 service under the contracts will be borne by Century. I want to
3 emphasize three points. First, as discussed below, the contracts
4 impose significant new supply risks on Century that are not borne by
5 any other Kenergy customer. Second, the contract terms are
6 acceptable only as a package and any modification of the terms will
7 make the entire arrangement unacceptable. Third, the cost recovery
8 provisions of the contracts are broad enough to include the incremental
9 costs of "live line" maintenance, which is critical to Century's ability to
10 operate its full load.

11 **Q. Please comment on the critical importance of timely**
12 **Commission approval of these contracts?**

13 A. As discussed in some detail in Mr. Byrne's Direct Testimony, continued
14 operation of the Hawesville Smelter depends upon the Commission
15 approving the proposed contracts, without modification, sufficiently in
16 advance of the August 19, 2013 termination date of the current
17 contract. To enable time for review of the Commission's order, final
18 internal approvals, and the actual exchange and execution of the
19 contracts, Commission approval on or before August 13, 2013 would be
20 ideal. I understand that Big Rivers is seeking approval from the Rural
21 Utilities Service on a comparable timeframe.

22 **Q. Are there specific issues you want to address?**

1 A. Yes. I want to address the issues relating to Coleman. Big Rivers has
2 requested authorization from MISO to suspend operation of all three
3 units of Coleman from September 1, 2013 through December 31, 2015.
4 MISO has concluded that if the Coleman units are not operating, then
5 the transmission system has sufficient capacity to deliver the full
6 amount of Century's load from the MISO market, but this ability is
7 compromised in the event of certain transmission contingencies –
8 specifically, forced line outages or planned outages for line
9 maintenance. Consequently, MISO will require Big Rivers to enter
10 into an SSR Agreement or will impose alternative arrangements that
11 will allow delivery of energy equal to the full Hawesville load, subject
12 to limited, specified reductions if certain contingencies occur.

13 **Q. Please explain the SSR Agreement?**

14 A. Under the SSR Agreement, MISO would take operational control of the
15 Coleman units and would operate the units as necessary to maintain
16 transmission reliability. Big Rivers would be reimbursed by MISO for
17 its costs as provided by the MISO tariff and specified in an SSR
18 Agreement between MISO and Big Rivers that has been accepted by
19 the Federal Energy Regulation Commission ("FERC"); MISO would
20 recover these costs, net of revenues MISO receives from the sale of
21 energy from the Coleman units, by charging specific MISO Load

1 Serving Entities, including Big Rivers; and, under the contracts, any
2 such charges imposed on Big Rivers would be paid by Century.

3 **Q. As long as Century is operating, how can the need for an SSR**
4 **Agreement be eliminated?**

5 A. As of the date of this testimony I have not received MISO's final
6 Attachment Y report on the suspension of Coleman. In evaluating
7 potential mitigation actions that would allow continued operation of
8 the Hawesville Smelter without an SSR Agreement, MISO staff
9 indicated , during a conference call on July 9th, that it needed
10 additional time to complete a further study on voltage stability. MISO
11 staff provided a report on this study on July 18th, which Century is still
12 evaluating. As I understand the report, however, Century can operate
13 at 482 MW with the Coleman units not operating provided (1) Century
14 installs additional capacitors to provide the voltage support that is lost
15 with the suspension of operations at Coleman and (2) Century's load is
16 subject to reduction by a protective relay system in the event of certain
17 transmission contingencies addressed below. The MISO report
18 indicates that outages of certain transmission lines—either a forced
19 outage or a planned outage for maintenance-- would require the
20 Hawesville Smelter load to be reduced. If Century completes its
21 evaluation of the MISO study prior to the hearing or determines that
22 additional mitigation equipment or measures would change the result

1 of the study, then Century will submit any necessary amendment to
2 this testimony.

3 **Q. Please explain “Base Load” and “Curtable Load”?**

4 A. Under the contracts, the “Curtable Load” is the amount of load
5 below 482 MW that is subject to reduction if a contingency occurs. The
6 “Base Load” is the amount at which Century can operate after a
7 protective relay is implemented. Both of these amounts will vary
8 depending on the particular contingency that occurs and on system
9 load conditions when the event occurs. With a package of mitigation
10 measures including the capacitors, protective relays, and potentially
11 other equipment (including dynamic reactive equipment) installed, and
12 the transmission system operating without contingencies, the Base
13 Load plus Curtable Load will equal 482 MW – Century’s full load. If
14 a contingency occurs, then the protective relays and other equipment
15 will reduce the smelter load by the amount necessary to prevent any
16 line over-loads or potential voltage issues. The amount of this load
17 reduction will depend on other system conditions at the time of the line
18 overload or outage and the extent of the particular line overload or
19 outage itself.

20 **Q. Has Century installed additional capacitors?**

1 A. Century is in the process of acquiring and installing the additional
2 capacitors, and expects them to be operational on or about August 19,
3 2013.

4 **Q. Is Century installing the protective relay system to reduce its**
5 **load in the event of contingencies?**

6 A. The specific requirements for the protective relay system are not yet
7 determined. Big Rivers and Century are working with MISO to
8 determine the appropriate protective relay system and to obtain any
9 necessary regulatory approvals. Depending on the type of protective
10 relay, approval may be required from the Dynamics Review
11 Subcommittee of the SERC Reliability Corporation ("SERC"). Review
12 and approval by the subcommittee could take up to 90 days. SERC is a
13 regional entity approved and operating under the North American
14 Electric Reliability Organization ("NERC"). The finalization of the
15 protective relays arrangement, and obtaining the necessary approvals,
16 need not be completed prior to August 19, 2013 and are not a
17 prerequisite to this Commission's approval.

18 **Q. What is Century's alternative if the capacitor additions and**
19 **protective relays are not in place by August 20th?**

20 A. If the capacitors or the protective relays are not in place by August
21 20th, and MISO determines that all or some of the Coleman units are
22 needed for reliability as of that date, then Century's alternative would

1 be to operate at 482 MW with all or some units of Coleman operating
2 under the SSR Agreement.

3 **Q. Please address the offset of transmission revenues against SSR**
4 **costs?**

5 A. Under the contracts Century pays the SSR costs incurred by Big
6 Rivers, which are offset by the transmission revenues paid by Century
7 to Big Rivers. The basis for this offset is that the SSR costs are
8 incurred only when Century is operating and thus paying transmission
9 revenues to Big Rivers. If Century closed, then there would be neither
10 the SSR costs nor the transmission revenues. The result of this offset
11 provision is that Century pays the net cost to Big Rivers, and Big
12 Rivers' other customers do not bear any additional costs. Moreover,
13 when the SSR Agreement and its associated costs end, Big Rivers will
14 still receive transmission revenues from Century, which will benefit
15 Big Rivers' other customers.

16 **Q. Please address the transmission contingencies?**

17 A. Big Rivers has significantly more capacity than load, even when
18 Century was served by Big Rivers, and Big Rivers sells that capacity
19 into the MISO market. However, while the transmission system may
20 allow Big Rivers' excess generation to operate and be sold into MISO,
21 the transmission system is not sufficient under all circumstances to
22 allow Big Rivers' generation to be closed and to reliably deliver a

1 comparable amount of power from elsewhere in MISO to serve load.
2 MISO's July 18th analysis indicates that an outage of the 345 kV
3 Davies to Coleman line or the 161 kv Newtonville to Coleman would
4 prevent Century from operating at 482 MW. Because of the potential
5 risk of a voltage collapse if there were a second line outage, MISO
6 indicates that the Hawesville Smelter load would be reduced to 230
7 MW. A reduction of Century's load in this amount would cause the
8 loss of several potlines at the smelter, which could be restarted only
9 with a multi-million dollar cost. Century is evaluating how the risk of
10 such load reductions, unless otherwise mitigated, will affect the
11 decision whether to continue operations after August 19th. If the risk
12 of load reductions— in frequency, size and duration—is too severe,
13 Century may be forced to close the smelter on August 20th.

14 **Q. How can this risk of load reductions be reduced?**

15 A. The risk of load reductions—in terms of frequency, size and duration--
16 can be reduced if planned outages for line maintenance on the lines
17 that pose the contingency risk are eliminated. This can be done by
18 “live line” maintenance which, as explained by Mr. Morrow, can be
19 done safely, reliably, cost-effectively, and at no additional cost to Big
20 Rivers or its system ratepayers. As evident from MISO's SSR filings
21 with FERC and FERC's orders approving such agreements and similar
22 “must run” agreements filed by other Regional Transmission

1 Organizations, FERC generally disfavors SSR Agreements. In the
2 July 9th call with MISO, Century raised the use of live line
3 maintenance as part of a combination of tools, including the capacitor
4 additions and protective relays, that would eliminate the need for an
5 SSR Agreement while still allowing delivery of energy for the
6 Hawesville Smelter's entire load subject only to a limited risk of load
7 reductions. An outcome in which the Hawesville Smelter was subject
8 only to a limited risk of infrequent, relatively small and short-duration
9 load reductions would justify continued operations. MISO was
10 receptive to such a combination of tools including live line
11 maintenance.

12 **Q. Would "live line" maintenance be more expensive or less safe**
13 **or less reliable than maintenance performance on de-energized**
14 **lines?**

15 A. Live line maintenance costs may be more expensive than the cost of
16 maintenance on de-energized lines. But, the additional cost of live line
17 maintenance would be a cost borne by Century as the contracts require
18 Century to reimburse Big Rivers for any net incremental costs.
19 If Big Rivers believes its maintenance crews cannot perform live line
20 maintenance safely, then there are transmission contractors with
21 experience in live line maintenance that Big Rivers may hire and,

1 again, these incremental costs would be paid by Century. Mr. Morrow
2 addresses these issues in detail in his Direct Testimony.

3 **Q Isn't Big Rivers' decision to perform or not perform live line**
4 **maintenance just part of the risk that Century must accept as**
5 **part of accessing its power supply from the market?**

6 A No. Century accepts the market risk that energy prices will change
7 and that there may be congestion pricing. Century is also prepared to
8 accept curtailments of load that are relatively small, infrequent, and
9 of a short-duration as a potential consequence of the protective relays
10 arrangement. But, the SSR costs are an administratively determined
11 above-market cost, and live line maintenance is a necessary and
12 appropriate tool than can and should be used to reduce or avoid that
13 above-market risk and to avoid load curtailments from becoming so
14 severe that Century must close the Hawesville Smelter.

15 **Q. What findings are you asking the Commission to make**
16 **regarding live line maintenance?**

17 A. For the reasons discussed above, and in Mr. Morrow's Direct
18 Testimony, the Commission should find that live line maintenance by
19 Big Rivers, on certain affected transmission lines that have been
20 identified by MISO, is consistent with good utility practice, and is both
21 necessary and appropriate to allow Century to operate at load levels
22 that are sufficient to continue full operation of the Hawesville Smelter.

1 This is not only consistent with the Commission's regulations requiring
2 utilities to make reasonable efforts to prevent interruptions of service,
3 but in the unique circumstances presented here, is needed to avoid an
4 unnecessary outage that would likely close the smelter.

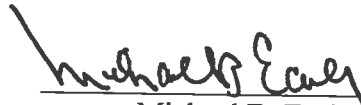
5 **Q. Does this conclude your testimony?**

6 **A. Yes.**

JOINT APPLICATION OF KENERGY CORP. AND BIG RIVERS
ELECTRIC CORPORATION FOR APPROVAL OF CONTRACTS AND
FOR A DECLARATORY ORDER
CASE NO. 2013-00221

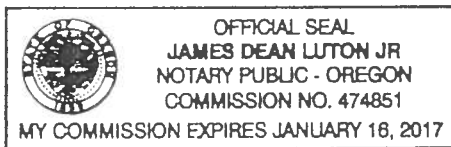
VERIFICATION

I, Michael B. Early, verify, state, and affirm that I prepared or supervised the preparation of the Direct Testimony filed with this Verification, and that such Direct Testimony is true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.


Michael B. Early

STATE OF OREGON)
COUNTY OF MULTNOMAH)

SUBSCRIBED AND SWORN TO before me by Michael B. Early on this
the 17 day of July, 2013.




Notary Public
My Commission Expires 01/16/2017