UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Midcontinent Independent System Operator, Inc.	)	Docket No. ER14-292-000
	)	Docket No. ER14-294-000
	)	(not consolidated)

PROTEST OF CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

Pursuant to Rule 211 of the Federal Energy Regulatory Commission ("FERC" or "Commission") Rules of Practice and Procedure,[1] Century Aluminum of Kentucky General Partnership ("Century") hereby files this Protest of the Midcontinent Independent System Operator, Inc.'s ("MISO") filing for approval of a System Support Resources ("SSR") Agreement with Big Rivers Electric Corporation ("Big Rivers").[2] MISO also filed a Schedule 43F to govern the allocation of SSR Costs that are associated with the SSR operation of Big River's Coleman Unit Nos. 1-3 ("Coleman").[3]

I. INTRODUCTION

The proposed SSR Agreement is interrelated with a series of agreements by and among Big Rivers, Century, and Kenergy Corp. ("Kenergy") for continued service to Century's Hawesville, Kentucky aluminum smelter ("Hawesville Smelter") commencing on and after August 20, 2013 ("Century Transaction"). As discussed in the affidavit of Michael B. Early (attached hereto as Exhibit A), the Century Transaction was designed to avoid closure of the Hawesville Smelter on August 20, 2013, which otherwise would have occurred due to

[1] *See* 18 C.F.R. § 385.211.
[2] *Midcontinent Independent System Operator, Inc.*, System Support Resources Agreement with Big Rivers Electric Corporation, Docket No. ER14-292-000 (Nov. 1, 2013) ("MISO SSR Filing").
[3] *Midcontinent Independent System Operator, Inc.*, Allocation of SSR Costs Associated with the Coleman Unit MISO Rate Schedule No. 43F, Docket No. ER14-294-000 (Nov. 1, 2013) ("MISO Schedule 43F Filing").

unsustainable electricity costs that were well above those of Century's competitors.[4] The Century Transaction agreements were structured to reflect and accommodate MISO's then-likely designation of Coleman as an SSR. Specifically, the Direct Agreement between Century and Big Rivers includes provisions obligating Century to pay all costs that are allocated to the Big Rivers Local Balancing Area ("LBA") related to operation of Coleman as an SSR.[5] The Protective Relays Agreement enables Century to install and operate mitigation measures supporting automatic curtailment of load at the Hawesville Smelter, which, as discussed in more detail below, will enable termination of the SSR Agreement for Coleman in the relatively near future.[6] The Capacitor Agreement addresses Century's installation of 200 MVAR of capacitors at the Hawesville Smelter, which also mitigates against the need for Coleman to remain in SSR status.[7] The Kentucky Public Service Commission ("PSC" or "Kentucky Commission") approved the Century Transaction in its entirety on August 14, 2013.[8]

On November 1, 2013, MISO submitted a filing in Docket No. ER14-292-000 requesting Commission approval of an SSR Agreement between Big Rivers and MISO. As explained in the SSR Filing, Big Rivers submitted an Attachment Y Notice to MISO on May 24, 2013, to suspend Coleman for a period of 28 months beginning September 1, 2013 and ending December 31, 2015.[9] MISO completed an analysis of the Attachment Y Notice and concluded that suspension of Coleman during the 28-month period, without load curtailment, would result in

[4] *See* Affidavit of Michael B. Early at 6 (Nov. 22, 2013) ("Early Affidavit") (attached hereto as Exhibit A).
[5] *See id.*; *see also* Direct Agreement By and Between Big Rivers Elec. Corp. and Century Aluminum of Ky. Gen. P'ship § 4.1 ("Direct Agreement") (attached to Early Affidavit as Exhibit A-1).
[6] *See* Early Affidavit at 4; *see also* Protective Relays Agreement By and Between Big Rivers Elec. Corp. and Century Aluminum of Ky. Gen. P'ship § 2.3 ("Protective Relays Agreement") (attached to the Early Affidavit as Exhibit A-2).
[7] *See* Early Affidavit at 4.
[8] *In re Joint Application of Kenergy Corp. and Big Rivers Elec. Corp. for Approval of Contracts and for a Declaratory Order*, Order, Case No. 2013-00221 (Ky. Pub. Serv. Comm'n Aug. 14, 2013) ("KPSC Order").
[9] *See* MISO SSR Filing at 2.

violations of certain reliability standards.[10] MISO notified Big Rivers of Coleman's SSR status on August 29, 2013; Big Rivers has since operated Coleman as an SSR pending approval of the SSR Agreement.[11]

Following Coleman's SSR designation, Big Rivers began negotiating with MISO and the MISO Independent Market Monitor ("IMM") to develop an appropriate SSR Agreement.[12] Pursuant to the Direct Agreement, Century was involved in some of these discussions. On September 19, 2013, Century provided comments to MISO on the proposed SSR Agreement in the hopes of resolving all issues prior to filing the agreement for Commission approval.[13] Century identified a number of concerns with the proposed SSR Agreement and arrangements, including whether MISO sufficiently evaluated all "feasible alternatives" to designating all three Coleman units as necessary for reliability through, and potentially beyond, May 30, 2014.[14] Century also noted that an SSR Agreement is not needed after Century implements its package of options, including a protective relays scheme (also known as a "Special Protection Scheme" or "SPS") and capacitor banks at the Hawesville Smelter, and including Big Rivers' performance of all scheduled maintenance on a live-line basis on the affected Big Rivers transmission lines.[15]

MISO's SSR Filing includes an SSR Agreement developed by MISO and Big Rivers for the period between September 1, 2013, and August 31, 2014. MISO and the IMM reviewed the financial operating cost information that Big Rivers provided for Coleman and agreed that $3,414,502 month is appropriate compensation for maintaining Coleman in operational status

[10] *See id.*
[11] *See id.* at 3.
[12] *See id.*
[13] Letter from Century Aluminum of Ky. Gen. P'ship to Midcontinent Indep. Sys. Operator regarding Coleman SSR Agreement and Cost Support, Sept. 19, 2013, at 2 (attached to Early Affidavit as Exhibit A-4).
[14] *See id. at 3.*
[15] *See id.*

and available for dispatch, as needed, as an SSR.[16] Additional compensation is provided if Coleman is dispatched.[17] All availability costs are subject to true-up and reconciliation on a 55-day lag basis.[18]

MISO proposes to allocate SSR costs associated with Coleman according to its proposed Schedule 43F, which was filed in Docket No. ER13-294-000 contemporaneously with the SSR Filing. Schedule 43F proposes to allocate Coleman's SSR Costs to the Load Serving Entities reliant on Coleman for reliability consistent with Section 38.2.7.k of the Tariff.[19] Schedule 43F would allocate 99.5 percent of Coleman SSR costs to the Big Rivers LBA. The remaining 0.5 percent of Coleman SSR costs would be allocated to the SIGE LBA.[20] MISO requests an effective date of September 1, 2013, for both the SSR Agreement and Schedule 43F.[21]

Century does not oppose MISO's Schedule 43F Filing.

Century does not oppose MISO's determination that Coleman Unit Nos. 1-3 should be designated as SSRs for a limited period of time.

Century does, however, oppose certain aspects of the SSR Filing, and urges the Commission to accept the SSR Agreement only if the SSR Agreement is subject to the conditions set forth in this Protest. Pursuant to the terms of the Century Transaction, Century will be directly responsible for 99.5 percent of all Coleman SSR costs (potentially more than $3 million per month) and, therefore, has a substantial interest in ensuring that the SSR Agreement is as limited in scope and duration as possible, while still satisfying reliability objectives.

[16] MISO SSR Filing at 11.
[17] *See id.*
[18] *See id.*, Exhibit D at 34.
[19] MISO Schedule 43F Filing at 3.
[20] *See id.*
[21] *See id.* at 4.

II. PROTEST

The Commission has consistently disfavored SSR agreements; they are intended to be a "last resort" for ensuring transmission reliability when a generation owner provides notification of unit suspension or retirement. In first approving MISO's SSR tariff provisions, the Commission determined that "[t]he SSR program is a backstop measure."[22] In more recent orders, the Commission has viewed SSR Agreements only as last-resort measures that should be limited in duration and scope.[23] The Commission has also reached nearly identical conclusions with respect to generation must-run arrangements in other regions.[24] Against this policy backdrop, Section 38.2.7(c) of the MISO Tariff obligates MISO to "assess . . . feasible alternatives to the proposed SSR agreement."[25] Given the Commission's strong distaste for SSR and similar arrangements, MISO's obligation to assess "feasible alternatives" must be read expansively. The Commission's stated preference for substantially limiting the duration and scope of any SSR Agreements, combined with a public interest incentive to avoid certain avoidable costs that Century would otherwise incur if the SSR Agreement were to be approved as filed, motivate a determination that approval of the SSR Agreement must be conditioned on Century's proposed recommendations as explained in this Protest.

Century provided information to MISO demonstrating a number of feasible alternatives to the proposed SSR Agreement months prior to its filing for Commission approval. While MISO's SSR Filing does recognize Century's installation of capacitors and Century's plans to

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[22] *Midwest Indep. Transmission Sys. Operator, Inc.*, 109 FERC ¶ 61,157 P 290 (2004); *see also id.* at P 291 ("SSR designation is a limited last-resort measure").
[23] *Midwest Indep. Transmission Sys. Operator, Inc.*, 140 FERC ¶ 61,237 (2012) ("We continue to expect that MISO will use SSR Agreements only as a last resort to meet short-term reliability needs precipitated by the retirement of a resource and will ensure that SSR Agreements have a limited and short duration."); *see also Midwest Indep. Sys. Operator, Inc.*, 142 FERC ¶ 61,170 P 45 (2013).
[24] *See, e.g., Devon Power LLC, et al.*, 103 FERC ¶ 61,082 P 31 (2003); *see also PJM Interconnection, LLC*, 117 FERC ¶ 61,331 P 77 (2006) ("The Commission disfavors 'out-of-market' RMR contracts.").
[25] *Midcontinent Indep. Sys. Operator, Inc.*, Open Access Transmission, Energy and Operating Reserve Markets Tariff § 38.2.7, *as amended by Midwest Indep. Transmission Sys. Operator, Inc.*, 140 FERC ¶ 61,237 (2012).

implement an SPS, the SSR Filing does not recognize other legitimate, viable, and feasible alternatives to an SSR Agreement. The result is that the SSR Agreement will likely be in place for a period longer than necessary and, even when the SSR Agreement is terminated, will leave a situation in which Century's ability to maintain firm transmission service will be jeopardized. Such an outcome is unjust, unreasonable and unduly discriminatory. Consequently, the Commission should condition approval of the SSR Agreement on adoption of these feasible alternatives, including Big Rivers' use of live-line maintenance on affected transmission lines, MISO's evaluation of long-term transmission solutions, and Big Rivers' good faith cooperation on prompt deployment of an SPS.

Century also protests two aspects of the cost recovery provisions of the SSR Agreement. First, the monthly budgeted availability payments include costs associated with a planned maintenance outage on Coleman Unit 1. The incurrence of these costs would be imprudent, because the maintenance would occur in the final weeks of the SSR Term and, thus, the maintenance would deliver no value to Century or to other customers that would be responsible for the maintenance expense. Moreover, any replacement energy costs that may be assessed if Coleman Unit 1 suffers a forced outage would ultimately be recovered from Century, given Century's commitments under the Direct Agreement to reimburse Big Rivers for such costs. Consequently, the analysis of whether to take Coleman Unit 1 out of service for maintenance involves only costs and avoided costs that would impact Century.[26] The Commission should make clear that Big Rivers will not be entitled to Coleman Unit 1 maintenance cost recovery. Second, Mr. Berry's Testimony indicates that Big Rivers will be earning a return of 7.85% on its "Net Rate Base." However, neither Big Rivers nor MISO provides any evidence that any return,

[26] Technically, a very small amount (0.5%) of any Coleman Unit 1 costs and avoided costs would impact the SIGE LBA.

and especially a return at this level, is just and reasonable. In the absence of substantial evidence demonstrating that a return on Net Rate Base is just and reasonable, as applied to Big Rivers, the Commission should deny this element of cost recovery.

A. Conditions Need To Be Imposed On Any Approval Of MISO's SSR Filing, To Account For All Feasible Alternatives To The SSR Agreement.

1. Live-Line Transmission Maintenance Should Be Required As One Component Of A Package of Feasible Alternatives to an SSR.

As filed, the proposed SSR Agreement does not require Big Rivers to use live-line transmission maintenance in lieu of de-energized transmission maintenance for planned maintenance on the transmission lines affected by the Coleman suspension notice. The SSR Agreement should impose such a requirement. Live-line maintenance is a critical component of the package of "feasible alternatives" to the SSR Agreement and is necessary for continued operation of the Hawesville Smelter.

Century has agreed, via the Direct Agreement approved by the Kentucky Commission, to reimburse Big Rivers for the incremental costs of live-line transmission maintenance and has agreed to indemnify Big Rivers against liability associated with live-line transmission maintenance;[27] notwithstanding, Big Rivers has consistently resisted Century's request that live-line maintenance be performed. Live-line maintenance is consistent with good and reasonable utility practice, as determined by the Kentucky Commission,[28] and is used in practice by other Kentucky utilities.[29] Live-line maintenance would help avoid the need for the SSR Agreement beyond the date when the SPS becomes operational, and would minimize curtailment of firm transmission service to Century both before and after that date.[30] Moreover, as explained in the

[27] Early Affidavit, Exhibit A-1 § 3.3; *see also id.* at 6.
[28] *See* KPSC Order at 14.
[29] *See* Affidavit of Donald J. Morrow at 12 (Nov. 22, 2013) ("Morrow Affidavit") (attached hereto as Exhibit B).
[30] *See id.* at 21-22; *see also* Early Affidavit, Exhibit A-4 at 3.

Early Affidavit, evidence exists that Big Rivers has recently scheduled live-line maintenance on transmission lines in the Big Rivers LBA.[31] Furthermore, the Attachment Y Study Report makes clear the interaction between certain affected transmission lines and suspension of Coleman operations. Live-line maintenance would allow Big Rivers to perform maintenance on these critical transmission lines while the lines are energized, which would avoid the need to take certain pre-contingency actions, including curtailment of load at the Hawesville Smelter. Live-line maintenance would keep transmission elements in service, and help avoid concerns regarding transmission outages occurring contemporaneously with generation unit outages at Coleman.[32] Given the substantial benefits of live-line maintenance to all parties impacted by the SSR Agreement, the Commission should require Big Rivers to perform live-line maintenance as a component of a package of "feasible alternatives" to continuation of the SSR Agreement.

As explained by Mr. Morrow, live-line maintenance in this context would entail performing scheduled maintenance on three Big Rivers transmission lines while those lines remain energized, which would help mitigate the need for an SSR arrangement.[33] Live-line maintenance would allow those lines to be kept in service during maintenance, and would help keep the transmission system in a more robust state. Without live-line maintenance, the transmission system would be operating without key transmission elements.[34] Using de-energized maintenance techniques on the three affected transmission lines would require that Century substantially reduce load levels at the Hawesville Smelter while scheduled transmission maintenance is being performed. This reduction of load "pre-positions" the system to withstand

[31] Early Affidavit at 6-7.
[32] *See* Outage Report (attached to Early Affidavit as Exhibit A-5); *see also* MISO SSR Filing, Exhibit B § V.
[33] Morrow Affidavit at 22-22
[34] *See id.* at 19-21.

the impacts of the next contingency.[35] Using live-line maintenance on these lines would eliminate the need to "pre-position" the system and, thus, would allow the Hawesville Smelter to operate at sustainable load levels while Coleman operation is suspended.

The Attachment Y Study Report supports this analysis. Section V of the Attachment Y Study Report identifies situations in which voltage collapse may occur as a result of coincident outages at Coleman and certain transmission facilities.[36] Live-line maintenance would eliminate the potential for such occurrences by ensuring continuous operation of the affected transmission lines. Accordingly, live-line maintenance would help enable termination of the SSR Agreement and help enable the Hawesville Smelter to avoid costly SSR payments and potentially catastrophic curtailments beyond the end of the SSR Term. The use of live-line maintenance (combined with other elements of the mitigation package developed by Century) is critical to the continued viability of the Hawesville Smelter.

Live-line maintenance is also consistent with good and reasonable utility practice. Live-line maintenance techniques are frequently used in the industry, including within the MISO footprint.[37] Live-line maintenance techniques are justified when implemented by qualified, trained staff using well designed work practices.[38] Century presented Mr. Morrow's expert testimony during the PSC proceeding approving the Century Transaction.[39] Based on Mr. Morrow's testimony, the PSC found the "evidence . . . shows that live line transmission maintenance is consistent with good and reasonable utility practice."[40] In addition to the PSC's findings on live-line maintenance, this Commission has approved the use of live-line transmission maintenance in other proceedings as consistent with good and prudent utility

[35] *See id.*
[36] MISO SSR Filing, Exhibit B § V.
[37] *See* Morrow Affidavit at 11.
[38] *See id.*
[39] *See* Early Affidavit, Exhibit A-4 at 3.
[40] KPSC Order at 14.

practice.[41] Accordingly, including live-line maintenance in the package of feasible alternatives is consistent with PSC and Commission precedent, and is an appropriate condition to impose on any approval of the SSR Agreement.

As noted previously, Big Rivers has consistently resisted Century's efforts to require the use of live-line maintenance. Big Rivers cites concerns regarding safety, and it presented testimony during the PSC proceeding that Big Rivers has never conducted live-line maintenance and is unable to do so.[42] Despite these assertions, no evidence was ever offered during the PSC proceeding demonstrating that live-line maintenance is unsafe or inconsistent with good and reasonable utility practice. Moreover, MISO's transmission outage data indicate that Big Rivers has, in fact, scheduled live-line maintenance with MISO on more than 100 occasions within the last 12 months.[43] As set forth in the Direct Agreement, Century has agreed and is obligated to pay for the incremental cost of performing live-line maintenance in connection with an SSR Agreement.[44] Moreover, Big Rivers' testimony during the PSC proceeding revealed that one of Big Rivers' current contractors has live-line maintenance qualifications.[45] Big Rivers' refusal to cooperate in scheduling live-line transmission maintenance appears to be a matter of preference rather than a matter of facing insurmountable obstacles.

Without the use of live-line maintenance on the affected transmission lines, the continued viability of the Hawesville Smelter is jeopardized because the Smelter cannot withstand sustained and persistent curtailments that would otherwise be necessary to accommodate

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[41] *Midwest Indep. Transmission Sys. Operator, Inc.*, 115 FERC ¶ 61,224 at P 12 (2006); *New England Power Pool*, 98 FERC ¶ 61,249 at 3-4 (2002).
[42] *See In re Joint Application of Kenergy Corp. and Big Rivers Elec. Corp. for Approval of Contracts and for a Declaratory Order, Case No. 2013-00221*, Testimony of Robert E. Berry, Hearing, Tr. 11:30-11:32 (July 30, 2013), *available at* http://psc.ky.gov/av_broadcast/2013-00221/2013-00221_30Jul13_Inter.asx ("Berry Hearing Testimony").
[43] *See* Early Affidavit, Exhibit A-5.
[44] *See* Early Affidavit, Exhibit A-1 § 4.1.
[45] Berry Hearing Testimony,Tr. 11:30:30.

simultaneous transmission line and generation unit outages. Given the critical need for live-line maintenance to facilitate continued operation of the Hawesville Smelter, the standard use of live-line maintenance as good and reasonable utility practice, and Big Rivers' apparent ability to conduct live-line maintenance, the Commission should condition any approval of the SSR Agreement on the performance of live-line transmission maintenance as part of a package of "feasible alternatives" to the SSR Agreement.

2. Transmission Upgrades Should Have Been Considered, and Should Be Considered, Among Feasible Alternatives.

Contrary to MISO's contention that "[s]ince Coleman is a suspension, transmission upgrades will not be in place before the expected return of Coleman to service,"[46] transmission upgrades should be considered because it is unknown when, or even if, Coleman will return to full operational status. In a letter and accompanying Attachment Y dated May 24, 2013, Big Rivers indicated that Coleman will be returned to service on January 1, 2016.[47] However, since May 24, 2013, Big Rivers has provided information that seriously calls into question the January 1, 2016 return-to-service date that Big Rivers included in its Attachment Y. Therefore, transmission upgrades should have been considered, and should be considered, among the feasible alternatives to reliance on an SSR Agreement, whether for the instant SSR Term or for any potential future SSR terms for Coleman.

On January 15, 2013, Big Rivers filed an application with the PSC requesting approval to increase its wholesale electric rates for service to its three member-owned distribution cooperatives – Jackson Purchase Energy Cooperative ("JPEC"), Kenergy Corp. ("Kenergy"), and Meade County Rural Electric Cooperative Corporation ("Meade"). The record developed in that proceeding included an in-depth discussion of the status of Coleman and, importantly, the record

[46] MISO SSR Filing at 7.
[47] *See id.*, Exhibit A.

did not include evidence that Coleman would be placed back into full operational status by January 1, 2016. In fact, in its Order dated October 29, 2013, the Kentucky Commission noted only that Big Rivers "is proposing to idle the Coleman Station for a number of years until reopening the facility is justified by new or increased system load or higher market prices for power."[48] There is no guarantee that Big Rivers will see increased load, and it is unlikely that market prices will increase to the point that Coleman is profitable by January 1, 2016. In fact, in his Supplemental Rebuttal Testimony in the PSC proceeding, Big Rivers' Chief Operating Officer, Robert W. Berry, testified that "[i]f the economics make restarting a plant economically advantageous to its Members, Big Rivers will do so. If not, it will not restart the idled units."[49] With the uncertainty surrounding the economics of Coleman, it is impossible for Big Rivers to know that it will be economical to restart Coleman on January 1, 2016.

Additionally, in a proceeding that is currently pending before the Kentucky Commission, Mr. Berry stated in his Direct Testimony dated October 30, 2013 that Coleman would not operate "until such time the wholesale market prices improve or until it can sell the capacity and energy previously utilized by the [Century]."[50] Never once in his Direct Testimony did Mr. Berry mention or indicate that Coleman would be placed back into full service on or before January 1, 2016. All evidence presented since Big Rivers sent its Attachment Y notice to MISO indicates that Big Rivers does not know, at this time, when or even if Coleman will be placed back into full service. The evidence suggests, instead, that any return-to-service date for Coleman will hinge on the uncertain economics of the Coleman units.

[48] *Application of Big Rivers Elec. Corp. for an Adjustment of Rates*, Order at 18-19, Case No. 2012-00535 (Ky. Pub. Serv. Comm'n Oct. 29, 2013).
[49] *Application of Big Rivers Elec. Corp. for an Adjustment of Rates*, Supplemental Rebuttal Testimony of Robert W. Berry at 13, Case No. 2012-00535 (Ky. Pub. Serv. Comm'n June 29, 2013).
[50] MISO SSR Filing, Exhibit E at 2.

The economic factors that influence whether Coleman returns to full operational status by January 1, 2016 are not favorable to that occurring. In the near future, Big Rivers will be required to undertake significant environmentally related capital expenditures in order to keep the Coleman units operational beyond Spring 2015.[51] Mr. Berry has testified that it will cost around $29 million to make Coleman MATS compliant.[52] The results of a study by Sargent & Lundy indicate that a long-term SSR is not economically viable for the Hawesville Smelter, as long-term operation of Coleman will require substantial new capital investments for various types of environmental compliance.[53] Mr. Berry has acknowledged that Coleman has "the least amount of pollution equipment installed" out of Big Rivers' entire generating fleet.[54] In the face of this evidence, it is simply not possible for Big Rivers to guarantee that Coleman will be returned to full operational status by January 1, 2016.

Finally, Big Rivers has indicated that it has tried to sell Coleman and will sell Coleman if it receives a fair offer. Specifically, Mr. Berry testified that "Big Rivers has offered Coleman for sale and would sell the plant if that would provide greater benefit to the members than idling the plant."[55] A sale of Coleman would create additional uncertainty regarding Coleman returning to full operational status by January 1, 2016.

The bottom line is that the end of the Coleman suspension on January 1, 2016 is highly uncertain. There is no guarantee that Big Rivers will be able to sell the capacity and energy

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[51] *See* Berry Hearing Testimony.
[52] *Id.*
[53] *Application of Big Rivers Electric Corporation for Approval of its 2012 Environmental Compliance Plan, For Approval of Its Amended Environmental Cost Recovery Surcharge Tariff, for Certificates of Public Convenience and Necessity, and for Authority to Establish a Regulatory Account*, Environmental Compliance Study, Case No. 2012-00063 (Ky. Pub. Serv. Comm'n Apr. 2, 2012).
[54] *Application of Big Rivers Elec. Corp. for an Adjustment of Rates*, Rebuttal Testimony of Robert W. Berry at 5, Case No. 2012-00535 (Ky. Pub. Serv. Comm'n June 24, 2013).
[55] *Application of Big Rivers Elec. Corp. for an Adjustment of Rates*, Supplemental Rebuttal Testimony of Robert W. Berry at 5. Case No. 2012-00535 (Ky. Pub. Serv. Comm'n July 1, 2013).

previously utilized by Century or that wholesale market prices will be such that it is economical to return Coleman to full operational status on January 1, 2016. Big Rivers also faces significant environmental expenditures if it decides to return Coleman to full service, which must be factored into the equation of whether it will be economical to run Coleman. Finally, Big Rivers added further uncertainty to the January 1, 2016 date by indicating that it has been trying to sell Coleman. Taken in their entirety, these circumstances underscore that it is highly uncertain (indeed, highly unlikely) that Coleman will be returned to full operational status by January 1, 2016.

The substantial uncertainty associated with the suspension period for Coleman calls into question MISO's decision not to explore potential long-term transmission solutions. MISO should have, and still should, consider transmission upgrades among the feasible alternatives to potential future SSR arrangements for Coleman.

MISO has the tools at its disposal to consider Coleman's operational status as part of the MISO planning process. Specifically, MISO has the requisite Tariff authority, and obligation, to factor into its transmission planning paradigm the likelihood that Coleman will not be returning to full operational status on or before January 1, 2016. MISO should also consider the localized, unhedgeable congestion costs that the Hawesville Smelter has incurred and may incur going-forward associated with Coleman unit outages. The MISO can and should factor those cost consequences into its transmission planning.

MISO has clear Tariff authority and obligations to undertake these evaluations. In 2006, MISO sought and received approval from the Commission to create a category of transmission expansion projects labeled regionally beneficial projects ("RBP"). In 2010, MISO sought and received approval from the Commission to add a new category of transmission projects known as

Multi-Value Projects ("MVP"), that "enable the reliable and economic delivery of energy in support of documented energy policy mandates and address multiple reliability and/or economic issues affecting multiple transmission zones."[56] In 2012, MISO sought and received Commission approval to change the eligibility requirements for Market Efficiency Projects ("MEP"). MISO sought the changes because over the four-year period in which the prior eligibility criteria were in place, only a single project in MISO satisfied the criteria for regional cost sharing. Moreover, in 2011, the Commission issued Order No. 1000, which established rules for regional transmission expansion planning by all utilities and RTOs.[57] In response to Order No. 1000, MISO sought and received Commission approval to eliminate regional cost-sharing for BRPs.[58] The Commission also found that MISO's proposed treatment of MVP and MEP projects satisfied the requirements of Order No. 1000 regarding regional cost allocation.[59]

With such a comprehensive and well-established transmission expansion planning process in place, MISO has the capability and authority to consider the circumstances described above in its transmission planning process. The Commission should condition its approval of the Coleman SSR Agreement on MISO's evaluation of transmission upgrades as a feasible alternative to any future SSR arrangements for Coleman. Because the end of Coleman's suspension is highly uncertain, it is very possible that transmission upgrades could be necessary and cost-effective means of addressing issues related to longer-term idling or retirement of Coleman.

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[56] *Midwest Indep. Transmission Sys. Operator, Inc.*, Initial Filing, Docket No. ER10-1791-000 at 2 (July 15, 2010).
[57] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Pub. Utils.*, 136 FERC ¶ 61,051 (2011).
[58] *Midwest Indep. Transmission Sys. Operator, Inc. and the MISO Transmission Owners, et al.*, 142 FERC ¶ 61,215 at P 518 (2013).
[59] *Id.* at P 519.

3. MISO And Big Rivers Should Be Directed To Facilitate Prompt Implementation of Century's Approved Special Protection Scheme.

Pursuant to the Protective Relays Agreement between Century and Big Rivers, Century has developed and will be installing "protective relays and related equipment" that would, as part of a package, help eliminate the need for the SSR Agreement.[60] Although the Protective Relays Agreement does not utilize the term SPS, the rights and obligations contemplated therein are consistent with the SERC Reliability Corporation's ("SERC") definition of SPS.[61] SPSs must be reviewed and approved by the SERC Dynamic Review Subcommittee before implementation.[62] Once approved, an SPS may serve as a critical component of a package of options that will serve as a feasible alternative to an SSR Agreement.

As indicated in the MISO SSR Filing, and further explained in the Early Affidavit, Century has proposed and designed an SPS that would "allow more flexibility to shed load automatically by employing relay equipment to monitor conditions and trip blocks of plant load to reduce loading on the transmission facilities."[63] On August 21, 2013, Siemens PTI presented an analysis to MISO showing that implementation of the package of options contemplated in the SPS is sufficient to prevent thermal overloads and voltage collapse when the Coleman units are not running.[64] Siemens PTI supplemented its findings on September 13, 2013, and concluded that upon implementation of the package of options that Century presented to MISO, the SSR

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[60] *See* Early Affidavit, Exhibit A-2 § 2.3.

[61] Specifically, SERC regulations require that an SPS "(A) Be designed to detect abnormal or predetermined system conditions, and (B) Perform corrective action(s) necessary in addition to the isolation of faulted components, and (C) Be installed either to meet the performance requirements of TPL-001, -002, or -003 or to address a problem associated with a TPL-004 contingency that the Planning Coordinator or Transmission Planner determines is necessary to mitigate." *See* SERC Special Protection System Guidelines at 1 (Oct. 6, 2011), *available at* http://www.serc1.org/Documents/SERC%20Standing%20Committee%20Documents/Reference%20Documents/Guidelines/SERC%20SPS%20Guidelines_Rev%200%20(10-06-11).pdf.

[62] *See* SERC Regional Criteria, Special Protections Systems, NERC Reliability Standards PRC-012 through 017 (Oct. 18, 2012), *available at* http://www.serc1.org/Documents/SERC%20Standing%20Committee%20Documents/Regional%20Criteria/SERC%20Reg%20Criteria_SPS_Rev%207%20(10-18-12).pdf ("SERC Guidelines").

[63] MISO SSR Filing at 8.

[64] *See* Early Affidavit, Exhibit A-4.

Agreement may be terminated.[65] Although the SPS has not yet been "finalized," the MISO SSR Filing indicates that once Century's SPS design is approved and implemented, "MISO would allow the SPS to provide the necessary load reductions to address the issues and allow the Coleman plant to suspend operations."[66]

In accordance with SERC registration requirements, the SPS developed by Century has been reviewed by the SERC Dynamic Review Subcommittee.[67] Century will therefore likely be able to deploy the SPS by late December 2013.[68] Given that the SPS represents an appropriate replacement for the SSR Agreement, and consistent with the Commission's requirement that SSR Agreements be strictly limited in scope and duration, the Commission should condition approval of the SSR Agreement on Big Rivers' full cooperation with prompt implementation of the SPS.

B. MISO And Big Rivers Have Not Demonstrated That All Elements Of Big Rivers' Availability Cost Budget Are Just And Reasonable.

1. In Order For The Reconciliation Provisions Of The SSR Agreement To Work Properly, The Costs Included In The Annual Budget Must Be Provided.

As a threshold matter, the SSR Agreement, at Exhibit 2(A), states that "The MISO payment to Participant is subject to true-up for the SSR Units based upon the actual costs incurred by Participant in operating the SSR Units, which shall be settled within 55 days after the last day of the month for each month of the Agreement." Century does not oppose this provision or oppose the true-up mechanism. However, in order for the true-up mechanism to be properly administered, and for Century (the party responsible for 99.5 percent of SSR costs) to know whether the costs are being properly trued-up and to confirm that such actual costs are just and reasonable, MISO and Big Rivers must be required to identify up-front the cost elements that are

[65] *Id.*
[66] MISO SSR Filing at 9.
[67] *See* SERC Guidelines at 3; *see also* Early Affidavit at 4.
[68] Early Affidavit at 4.

included in the Annual Budget amount. As presented in the SSR Filing, the Commission has no basis for determining whether the Monthly SSR Payment of $3,414,502 for Units 1-3 or the Monthly SSR Payment of $2,250,936 for Units 2-3 is just and reasonable.

MISO and Big Rivers should be required to identify, in detail, the types of costs and level of each cost element that has been included in the monthly totals stated above. MISO and Big Rivers should also provide to Century, which will be responsible for at least $12 million in Coleman SSR-related costs, a complete accounting of the actual costs for which Big Rivers is seeking recovery.

2. Big Rivers Should Not Be Allowed to Recover Any Maintenance Outage Costs

In his Direct Testimony for this proceeding, Mr. Berry stated that "[t]he amount paid or charged by MISO will reflect actual plant O&M and maintenance capital costs incurred in accordance with Good Utility Practice and any unit's operational requirements under the SSR Agreement."[69] Although Mr. Berry does not elaborate, these "maintenance capital costs" would, ostensibly, include maintenance costs that are incurred during an outage of one or more of the Coleman units.

If the "maintenance capital costs" to which Mr. Berry refers includes capital costs for an upcoming Coleman unit outage, then Century protests and challenges the prudence of the incurrence of these types of costs. Assigning such costs to customers would be unjust and unreasonable because the customers are unlikely to receive the benefits (via continued unit operation) of any maintenance outage. As described in detail above, SPS approvals are proceeding, and it is likely that the SPS will be available for deployment by late December 2013. Once the SPS is implemented, the SSR Agreement will be terminated. Any outage could, and

[69] MISO SSR Filing, Exhibit E at 7 (emphasis added).

likely would, last through the end of the remainder of the SSR Term, which means that customers paying for SSR costs would get no benefit from investing in a maintenance outage. Therefore, given the timing of the SPS implementation, and the limited remaining term of the SSR Agreement, any maintenance outage expenditures would be imprudent. Absent Big Rivers providing evidence that it is legally obligated to take one or more Coleman units out of service for maintenance by a certain date, and evidence that customers paying for SSR costs would get some benefit from that maintenance outage, Big Rivers should not be permitted to recover costs associated with any maintenance outage.

3. The Proposed 7.85 Percent Return on Net Rate Base Is Excessive; Any Return Should Be No Higher Than Big Rivers' Actual Cost of Capital.

MISO and Big Rivers propose, as part of the Annual SSR Amount, a Return on Net Rate Base that is equal to 7.85 percent.[70] This return has not been demonstrated to be just and unreasonable, and may be unjust and unreasonable. As a Rural Utilities Service ("RUS") debt-financed rural cooperative, Big Rivers' actual cost of capital should be much lower than the 7.85 percent requested by MISO and Big Rivers. In fact, as of April 30, 2013, Big Rivers' actual cost of capital appears to have been 5.012 percent.[71] Even adding in Big Rivers' Times Interest Earned Ratio ("TIER") of 1.24 percent, the overall cost of capital would be 6.215 percent, not 7.85 percent.[72] Additionally, Big Rivers anticipates that its actual cost of capital will be even lower as of August 31, 2014. Big Rivers forecasts that as of August 31, 2014, its actual cost of capital will be 4.927 percent (6.109 percent if the 1.24 percent TIER Requirement is added).[73]

[70] MISO SSR Filing, Exhibit E: at 5.
[71] *Application of Big Rivers Elec. Corp. for an Adjustment of Rates*, Application Vol. 4 at Tab No. 56, Case No. 2012-00535, (Ky. Pub. Serv. Comm'n Jan. 15, 2013).
[72] *Id.*
[73] *Id.*

Allowing any return on the items included in the description of Net Rate Base has not been demonstrated to be just and reasonable. Moreover, even if a return is permitted, setting the return at levels in excess of Big Rivers' actual cost of capital allows Big Rivers to earn more than is necessary to operate Coleman as an SSR, at the expense of the customers (notably, Century) that will be paying the SSR costs. Because Big Rivers is able to finance its capital expenditures at a lower rate than 7.85 percent, the Commission should require that a Return on Net Rate Base, if permitted at all, at least be set no higher than Big Rivers' demonstrated, actual cost of capital.

III. CONCLUSION

WHEREFORE, Century Aluminum of Kentucky General Partnership respectfully requests that the Commission accept the SSR Agreement effective September 1, 2013, subject to the conditions discussed in this Protest.

Respectfully submitted,

McNEES WALLACE & NURICK LLC

/s/ Robert A. Weishaar, Jr.
By _____

Robert A. Weishaar, Jr.
Andrew S. Ziegler
777 North Capitol Street, NE
Suite 401
Washington, D.C. 20002-4292
Phone: (202) 898-5700
Fax: (717) 260-1765
rweishaa@mwn.com
aziegler@mwn.com

Elizabeth P. Trinkle
100 Pine Street
Harrisburg, PA 17108-1166
Phone (717) 237-5378
Fax: (717) 260-1759
etrinkle@mwn.com

Counsel to Century Aluminum of Kentucky General Partnership

Dated: November 22, 2013

CERTIFICATE OF SERVICE

I hereby certify that I have this day served, via first-class mail, electronic transmission, or hand-delivery the foregoing upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Washington, DC this 22nd day of November, 2013.

/s/ Robert A. Weishaar, Jr.

Robert A. Weishaar, Jr.
McNees Wallace & Nurick LLC
777 North Capitol Street, NW
Suite 401
Washington, DC 20002-4292
Phone: (202) 898-5700
Fax: (717) 260-1765
rweishaa@mwn.com

List of Exhibits

Exhibit A

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Midcontinent Independent System Operator, Inc.	)	**Docket Nos. ER14-292-000**
	)	**ER14-294-000**
	)	**(not consolidated)**

AFFIDAVIT

OF

MICHAEL B. EARLY

ON BEHALF OF

CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

November 22, 2013

AFFIDAVIT

OF

MICHAEL B. EARLY

Q. Please state your name and position.

A. I am Michael B. Early. I am the Corporate Energy Director for Century Aluminum. My business address is One South Wacker Drive, Suite 1000, Chicago, IL 60606. In that position, I am responsible for electricity supply and prices at Century's four U.S. primary aluminum smelters, including the smelter located in Hawesville, Kentucky ("Hawesville Smelter").

Q. What issues does your affidavit address?

A. My affidavit is in support of Century's Protest to the SSR agreement and costs submitted by MISO for the Coleman generating units of Big Rivers Electric Corporation ("Big Rivers"). My affidavit addresses the following points:

1. The importance of both price and reliability of electric power supply to the Hawesville Smelter.
2. The reasons for Century's support for a short-term SSR agreement and for acceptance of a Special Protection Scheme ("SPS") as a stop-gap measure.
3. Among the conditions that the Commission should impose in approving the SSR agreement are: (1) live-line transmission maintenance by Big Rivers and (2) a determination by MISO of transmission upgrades or expansions as an alternative to the SSR and the SPS.

Q. Please explain why both price and reliability of supply are critical to continued operation of the Hawesville Smelter.

A. The Hawesville Smelter is a primary aluminum smelter. It converts a refined ore (alumina) into aluminum using an electrolytic process. Large "pots", containing a very hot bath through which the electric current is passed, convert the alumina into aluminum. The process is continuous and any interruption of power supply for more than a few hours will cause the molten aluminum in the pot to solidify. Once this occurs the pot cannot be "restarted" by simply restoring the electricity supply; rather, the pot must be rebuilt. The cost to restart all five potlines at the Hawesville Smelter would be tens of millions of dollars. At full production, Hawesville uses about 482 MW every hour. Power costs are the single largest production cost and, as a practical matter, power costs – together with reliability of supply – will determine whether the Hawesville Smelter can operate economically or will be forced to close.

Q. Please explain why a short-term SSR arrangement was necessary for the Hawesville Smelter to continue full operations after the power contract with Big Rivers and Kenergy ended.

A. Century terminated its power contract with Big Rivers and Kenergy Corp., the local distribution company, effective August 20, 2013, because Big Rivers' then-current and expected power rate was substantially above the power rates for U.S. smelters. Century entered into new contracts with Big Rivers and Kenergy, subsequently approved by the Kentucky Public Service Commission ("PSC") on August 14, 2013. These new contracts provide for a "pass-through" price based on MISO energy and capacity prices, transmission and ancillary services charges, and certain additional costs under the

contracts. Two of these contracts – the Direct Agreement and the Protective Relays Agreement – are particularly relevant to the issues in this proceeding. I am attaching them as Exhibits A-1 and A-2, respectively. Century is not supplied under these contracts from Big Rivers' generation. Consequently Big Rivers decided to "suspend" operation of the three Coleman generating units, which are adjacent to the Hawesville Smelter, and requested authorization from MISO for the suspension. MISO concluded that due to transmission constraints, the Hawesville Smelter could not operate at 482 MW with all Coleman units closed and with no other feasible alternatives in place. Without a transmission upgrade, and prior to implementation of feasible alternatives, the SSR was needed to allow the Hawesville Smelter to operate at 482 MW. However, because Kentucky is not a retail access state, Big Rivers was able to contractually impose additional costs on Century, beyond those costs ordinarily recoverable by a generator under an SSR agreement, including responsibility for 100% of any and all SSR costs allocated to the Big Rivers local control area and 100% of any replacement power costs if an SSR unit that clears the day-ahead market suffers a forced outage.

Q. Why is a long-term SSR not a viable option for Century?

A. A long-term SSR is not economically viable for the Hawesville Smelter as long-term operation of Coleman will require substantial new capital investments in late 2014 or early 2015 for environmental compliance, which would significantly increase the SSR costs and make the overall power cost to the Hawesville Smelter significantly higher than competitors' power costs. This information regarding the costs of compliance was provided in, among other places, a study by Sargent & Lundy that was included as part of Big Rivers' Application for 2012 Environmental Compliance Plan, which was filed with the Kentucky PSC in Case No. 2012-00063. I am attaching the Executive Summary of the Sargent & Lundy study as Exhibit A-3.

Q. What does Century propose as a feasible alternative to a long-term SSR in order to maintain Hawesville Smelter operations?

A. Century has developed a package of feasible alternatives to a long-term SSR Agreement. The package includes 200 MVAR of capacitors at the Hawesville Smelter, which are already operational; an SPS that would allow automatic curtailment of the Hawesville Smelter load but would avoid the need to curtail the Hawesville Smelter load on a pre-contingency basis, which would occur in the absence of an SPS; and performance of live-line transmission maintenance by Big Rivers, which would eliminate contingencies that would otherwise result in curtailment of the Hawesville Smelter load. Century conveyed these feasible alternatives to MISO in a letter dated September 19, 2013, which I am attaching as Exhibit A-4. Century also suggested to MISO, in meetings, that MISO evaluate transmission upgrades that may be necessary in light of the Coleman suspension. Century now has additional evidence that Coleman is unlikely to return to full operational status by January 1, 2016, further heightening the need for MISO to evaluate transmission upgrades.

Q. What is the status of the capacitor installation?

A. The 200 MVAR of capacitors were recently installed the Hawesville Smelter, and are now operational. These capacitors are in addition to approximately 93 MVARs of capacitors owned by Big Rivers that were already in operation near the Hawesville Smelter.

Q. What is the status of the SPS approvals?

A. An SPS requires approval by the SERC Reliability Corporation and, in particular, the SERC Dynamic Review Subcommittee. Century is currently obtaining SERC approval of

an SPS that will allow the Coleman units to close and allow MISO to terminate the SSR Agreement. Century expects to have all SERC approvals and have the SPS installed and operational by the end of December 2013.

Q. Does the SPS put Hawesville Smelter operation at risk for substantial curtailments?

A. Yes. The SPS - like the SSR – is a short-term, stop-gap measure. On behalf of Century, Siemens PTI has designed the combination of capacitor additions mentioned above to provide voltage support when the Coleman units close and automatic breakers to curtail smelter load if certain transmission contingencies occur. This combination will allow the Hawesville Smelter to operate at 482 MW. However, there is a substantial likelihood of actual curtailments and of significant, localized, and unhedgeable congestion costs. For example, in the single event of an outage of the 345 kV Davies to Coleman line or the 168/138 Newtonville transformer, without any other contingency, the SPS would curtail 1 to 3 potlines in the first case and one potline in the second case depending on system loading at the time. While Big Rivers is currently performing maintenance on some of the affected lines, Big Rivers will take these lines out-of-service for maintenance as needed, so a curtailment becomes a certainty at some point, with the potential loss of potlines. Further the SPS would implement curtailments of 1 to all 5 potlines for at least 11 pairs of line outages and 7 pairs of line/transformer outages. Curtailments that occur too frequently, or any single curtailments that last too long, present risks that are too severe to justify any new capital investment in the plant and will lead to closure of the Hawesville Smelter.

Q. Does the SPS present a viable option to address long-term transmission needs in the area?

A. No. I understand from MISO's filing that MISO did not explore transmission upgrades as a feasible alternative to an SSR because Big Rivers has represented that suspension of the Coleman units would end on December 31, 2015, and that the Coleman units would return to full operational status on January 1, 2016. As explained in the Protest, Big Rivers' own statements indicate that the return of the Coleman units to full operational status on January 1, 2016 is highly unlikely. In light of this new and additional evidence, MISO should be required to evaluate now the need for transmission system upgrades, to ensure the availability of firm transmission service for the Hawesville Smelter and adequate reliability in the local area on a long-term basis.

Q. What other measures does Century propose to support reliability in the local area while MISO considers long-term transmission upgrades?

A. The Commission should require Big Rivers to perform live-line transmission maintenance, to reduce the risk of a curtailment under the near-term SSR Agreement and, after that, under the SPS arrangement. A transmission maintenance outage substantially, and needlessly, increases the risk of a curtailment under the SSR and SPS. As discussed in Mr. Morrow's affidavit, also included with Century's Protest, live-line maintenance is now standard utility practice and is as safe as, or safer than, maintenance on energized lines. The Kentucky PSC has found that live-line maintenance is consistent with good and reasonable utility practice, and Century has offered to reimburse Big Rivers for any incremental costs incurred to perform live-line maintenance, including the cost of third party crews trained on live-line maintenance, and has agreed to indemnify Big Rivers against any claims associated with live-line maintenance. Big Rivers has simply refused, as a matter of its "internal policy," to perform any live-line maintenance, even though it

is in the best interest of its customers and despite having scheduled numerous live line maintenance events with MISO over the last year. For example, the closure of the Hawesville Smelter will cause the loss of $9 million/year of transmission revenues and adversely impact the local economy in the area in which Big Rivers operates.

Q. Have there been recent outages in the Big Rivers zone that have adversely affected operations at the Hawesville Smelter?

A. Yes. Century recently commissioned an analysis of the scope of recent transmission outages in the Big Rivers zone and the impact of those outages on Century. Further, Big Rivers is already scheduling live-line maintenance. The attached "Report on Big Rivers' Transmission Outages" ("Outage Report"), attached as Exhibit A-5, shows over 100 instances in 2013 when Big Rivers has submitted schedules to MISO for "hot line work" ("HLW"), and 36 instances when the HLW was scheduled solely on Big Rivers' facilities. We cannot determine from public documents the nature of the HLW, but plainly Big Rivers can no longer stand on an "internal policy" that it does not do any HLW. Finally, the Outage Report shows that Big Rivers erroneously posted out-of-service ("OOS") work when no work was done. While this did not create any reliability issue, it did impose a substantial and unnecessary increase in the day-ahead market price on Century. If Big Rivers was required to do HLW, this risk and cost could be avoided.

Q. Would live-line maintenance alone resolve Century's concerns?

A. No. Live-line maintenance would mitigate curtailment risk, but not resolve the curtailment risk completely, nor would it resolve the congestion risk completely. To support long-term viability, a transmission expansion or upgrade is needed. Even with the SSR, transmission to the Hawesville Smelter needs an upgrade. On October 10, 2013,

during the period when Coleman was operated "as if" an SSR were in place, the Hawesville Smelter was curtailed by 35 MW and was put on notice that a longer curtailment could be needed because a Coleman unit failed during a planned transmission outage.

Q. Why does a long-term transmission solution need to be evaluated and recommended by MISO?

A. MISO failed to evaluate transmission upgrades as a long-term alternative to the SSR/SPS arrangements simply because Big Rivers requested that the Coleman "suspension" run only through 2015. The facts show, to the contrary, that Coleman is highly unlikely to return to operation by 2016, if ever. Big Rivers' testimony at the Kentucky PSC is that Coleman will return to full operational status only when market prices increase. Big Rivers does not say when this will occur, but Big Rivers' testimony (Direct Testimony of Robert Berry, at pp. 21-22) confirms this will not occur prior to January 1, 2016.. As Big Rivers' other industrial customers stated in the Kentucky PSC proceeding to increase Big Rivers' rates (KPSC Case No. 2012-00535), Big Rivers' claim that it will restart Coleman any time soon, if ever, has no economic justification. As an example, I am attaching, as Exhibit A-6, an excerpt from the Direct Testimony of Lane Kollen on behalf of the Kentucky Industrial Utility Customers. In these circumstances, there is no justification for MISO not to identify and implement the transmission expansion alternatives that would address closure of Coleman. For example, Siemens PTI has determined that two of the lines affected by the Coleman suspension are rated at 1200 amps, well below the expected rating for the lines, but a typical rating for certain terminal equipment. It may be that the terminal equipment is no longer properly sized for system

conditions with Coleman closed. MISO should be evaluating whether there are any transmission alternatives, even relatively low-cost terminal equipment upgrades, that would provide at least a partial solution to localized transmission deficiencies upon closure of Coleman. These transmission solutions should be considered as preferred alternatives to long-term SSR and SPS arrangements. If MISO does not evaluate the transmission alternatives, it is likely that as Coleman remains closed for the long-term, Century will be forced into load curtailment solutions until, eventually, such curtailments and significant, localized, and unhedgeable congestion costs force Century to close the Hawesville Smelter. In effect, MISO's answer to the transmission constraint issues presented by the indefinite Coleman suspension is to force the Hawesville Smelter to close by increasing the Smelter's costs or by repeatedly curtailing the Hawesville Smelter load. That solution is not, in my view, an outcome that is just and reasonable or consistent with the public interest.

Q. Do this conclude your Affidavit?

A. Yes.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Midcontinent Independent System Operator, Inc.	)	Docket No. ER14-292-000
	)	Docket No. ER14-294-000
	)	(not consolidated)

VERIFICATION

I, Michael Early, am submitting this affidavit in the above-captioned proceeding for Century Aluminum of Kentucky General Partnership. I submit this verification to verify that the affidavit of Michael Early was prepared by me and/or with the assistance of others working under my direction and supervision, and that the contents are true to the best of my knowledge, information, and belief.

Michael Early

SUBSCRIBED AND SWORN to before me
on this 21st day of November, 2013

Notary Public

OFFICIAL SEAL
DANA M. KNAPP
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES MAR. 25, 2016

My commission expires: 3-25-2016

EXHIBIT A-1

Execution Date

DIRECT AGREEMENT

Dated as of August 19, 2013

by and between

BIG RIVERS ELECTRIC CORPORATION

and

CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

DIRECT AGREEMENT

This DIRECT AGREEMENT ("Agreement") is made and entered into as of August 19, 2013, by and between BIG RIVERS ELECTRIC CORPORATION, a Kentucky electric generation and transmission cooperative ("Big Rivers"), and CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP, a Kentucky general partnership ("Century"). Big Rivers and Century are sometimes referred to herein collectively as the "Parties" and individually as a "Party."

RECITALS

A. Kenergy Corp., a Kentucky electric cooperative corporation and a member of Big Rivers ("Kenergy"), currently supplies and delivers retail electric energy and related services to Century, the owner and operator of an aluminum reduction plant in Hawesville, Kentucky, pursuant to a Retail Electric Service Agreement, dated July 1, 2009 (as amended, the "Existing Retail Agreement").

B. Kenergy currently purchases wholesale electric energy and related services for resale to Century from Big Rivers, pursuant to a Wholesale Electric Service Agreement, dated as of July 1, 2009 (as amended, the "Existing Wholesale Agreement").

C. Century gave notice of termination of the Existing Retail Agreement on August 20, 2012.

D. Kenergy is willing to supply and deliver, and Century is willing to purchase, electric energy and related services from the wholesale electric market, including pursuant to bilateral contracts, on the terms and conditions set forth in the Electric Service Agreement, dated as of the date hereof (as amended, the "Electric Service Agreement").

E. In connection with and as a condition to entry into the Electric Service Agreement, Kenergy and Big Rivers have agreed to enter into the Arrangement and Procurement Agreement, dated as of the date hereof (the "Arrangement Agreement"), to facilitate Big Rivers acting, at least initially, as the Market Participant (as defined below) to obtain electric energy and related services from the wholesale electric market, including pursuant to bilateral contracts, for resale by Kenergy to Century.

F. The Parties desire to set forth in this Agreement certain obligations owed to each other that will survive the appointment and approval of a Market Participant other than Big Rivers and termination of the Arrangement Agreement.

AGREEMENT

NOW, THEREFORE, in consideration of the premises and the mutual covenants hereinafter set forth, the Parties, intending to be legally bound, hereby covenant and agree as follows:

1. Definitions; Rules of Interpretations. Capitalized terms used in this Agreement and not defined herein have the meanings assigned to those terms in the Electric Service Agreement; *provided*, that if the Electric Service Agreement is terminated prior to the satisfaction in full of all obligations of the Parties hereunder, capitalized terms defined by reference to the Electric Service Agreement shall have the meanings at the time of termination; *provided further*, that the definition of "Costs" herein shall refer to costs of Big Rivers and not Kenergy and the Exhibit A hereto will supplant the reference to Exhibit B in the Electric Service Agreement. The rules of interpretation set forth in Section 1.2 of the Electric Service Agreement shall apply to this Agreement as though fully set forth herein. References to any SSR Agreement herein shall include any SSR Agreement entered into in substitution or replacement of a SSR Agreement that is expiring in accordance with its terms.

2. Effectiveness. This Agreement shall commence on the date first written above, provided that the obligations of the Parties under Section 3 and Section 5 shall not commence until the Effective Date.

3. Covenants and Agreements.

3.1 Electric Service Agreement. Century shall (a) fully perform and discharge all of its obligations under the Electric Service Agreement unless excused in accordance with the terms thereof; (b) not act or rely upon any written or oral waivers granted by Kenergy of Century's performance under or compliance with provisions of the Electric Service Agreement that could be reasonably expected to materially adversely affect Big Rivers' rights or interests under this Agreement or the Arrangement Agreement without the prior written consent of Big Rivers; (c) so long as the Arrangement Agreement is in effect, (i) not waive the performance and discharge by Kenergy of its material obligations under the Electric Service Agreement without the prior written consent of Big Rivers; (ii) not amend or modify the Electric Service Agreement without the prior written consent of Big Rivers; (iii) not terminate or repudiate the Electric Service Agreement (including by rejection or similar termination in a bankruptcy proceeding involving Century) other than in accordance with the provisions thereof without the prior written consent of Big Rivers; and (iv) make payments pursuant to the Electric Service Agreement when due and in accordance therewith for so long as such agreement exists; (d) not take any action or support any action by others that in any manner would impede Century's ability to fulfill its obligations to Kenergy or Big Rivers under the Electric Service Agreement, this Agreement or any other Transaction Document to which it is a party or act in any manner that could reasonably be expected to materially adversely affect its ability to perform or discharge its obligations under this Agreement; (e) provide Big Rivers with a copy of all notices sent to Kenergy pursuant to the Electric Service Agreement; and (f) not assign or transfer (by operation of law or otherwise) any rights or interests that it may have in the Electric Service Agreement except in accordance with Article 17 thereof; *provided*, that any transfer or assignment pursuant to Article 17 thereof that requires the consent or approval of Kenergy also shall require the consent of Big Rivers.

3.2 Arrangement Agreement. Big Rivers shall (a) fully perform and discharge all of its obligations under the Arrangement Agreement unless excused in accordance with the terms thereof; (b) not act or rely upon any written or oral waivers granted by Kenergy of Big Rivers' performance under or compliance with provisions of the Arrangement Agreement that could be reasonably expected to materially adversely affect Century's rights or interests under

the Electric Service Agreement without the prior written consent of Century; (c) enforce the performance and discharge by Kenergy of its material obligations under the Arrangement Agreement and not waive the performance and discharge by Kenergy of its material obligations thereunder; (d) not amend or modify the Arrangement Agreement without the prior written consent of Century; (e) not terminate or repudiate the Arrangement Agreement (including by rejection or similar termination in a bankruptcy proceeding involving Big Rivers) other than in accordance with the provisions thereof; (f) not take any action or support any action by others that in any manner would impede Big Rivers' ability to fulfill its obligations to Kenergy or Century under the Arrangement Agreement, this Agreement or any other Transaction Document to which it is a party or act in any manner that could reasonably be expected to materially adversely affect its ability to perform or discharge its obligations under this Agreement; (g) provide Century with a copy of all notices sent to Kenergy pursuant to the Arrangement Agreement; and (h) not assign or transfer (by operation of law or otherwise) any rights or interests that it may have in the Arrangement Agreement except in accordance with Article 17 thereof; *provided*, that any transfer or assignment pursuant to Article 17 thereof that requires the consent or approval of Kenergy also shall require the consent of Century.

3.3 Coleman Generation Station.

(a) As of the date hereof, Big Rivers is pursuing or will have entered into an SSR Agreement (the "Initial SSR Agreement") regarding the obligation of Big Rivers to operate and maintain, dispatch or make available the Coleman Generation Station, until such time as MISO determines an SSR Agreement is not required. Big Rivers shall maintain the Initial SSR Agreement, and seek its termination, in accordance with this Agreement and the Initial SSR Agreement.

(b) In any MISO negotiation of the Initial SSR Agreement, Big Rivers shall provide Century with a reasonable opportunity to review and comment on all material information, proposals and submittals made by Big Rivers to MISO in such negotiation. Big Rivers and Kenergy shall not limit or prohibit Century's ability to discuss or engage with MISO regarding issues arising under the Initial SSR Agreement as it pertains to Century. Big Rivers agrees that it will not enter into the Initial SSR Agreement without Century's consent, *provided, however*, that if Century fails to consent, then Century shall limit its Load to not more than the Base Load plus, if applicable, the Curtailable Load.

(c) Big Rivers will use reasonable commercial efforts to structure the Initial SSR Agreement to permit Big Rivers to request termination of the SSR Agreement following 30 days' notice by Big Rivers to MISO, or by MISO to Big Rivers, that an SSR Agreement is no longer required or after confirmation by Century that it will operate at or below the Base Load plus, if applicable, the Curtailable Load effective immediately prior to and following termination of the SSR Agreement. Big Rivers will request and advocate to MISO for the allocation and recovery of the costs of the Initial SSR Agreement on the basis of coincident peak demands.

(d) If the Initial SSR Agreement is not terminated effective as of May 30, 2014 or earlier, then thereafter (i) Century shall limit its Load to not more than the Base Load

plus, if applicable, the Curtailable Load or (ii) Century shall pay all SSR Costs in accordance with this Agreement.

(e) During the term of the Initial SSR Agreement, if a major failure, casualty or mechanical breakdown occurs at one or more units of the Coleman Generation Station designated as SSR units, Century shall become responsible for the lesser of (i) the capital repair Costs of the applicable units, but not to exceed Big Rivers' property casualty insurance deductible with respect to such major failure, casualty or breakdown, or (ii) if less than three units of the Coleman Generation Station are required to operate under the Initial SSR Agreement, then the restart Costs of an idled unit of the Coleman Generation Station. Big Rivers covenants that the deductible for the property casualty insurance policy for the Coleman Generation Station is $1 million and shall not be increased during the term of this Agreement.

(f) Century acknowledges and agrees that, if Century's Load exceeds the Base Load plus, if applicable, the Curtailable Load, then Century must pay all SSR Costs in accordance with this Agreement, or reduce its Load to a level not in excess of the Base Load plus, if applicable, the Curtailable Load.

(g) Subject to Section 4, Century acknowledges and agrees that (i) Big Rivers will charge Century for all SSR Costs, subject only to the offsets set forth in Section 4.1(a)(i) and (ii) to the extent any such offsets are actually received by Big Rivers; (ii) Century shall be obligated to pay for all SSR Costs during periods in which other Persons to whom the RTO or ISO has preliminarily or definitively allocated responsibility for a portion of the SSR Costs are not paying such costs, whether as a result of a challenge to a SSR Agreement or otherwise, and (iii) the absence, existence, effectiveness or unenforceability of an SSR Agreement shall not affect Century's obligation to pay SSR Costs pursuant to Section 4 if operation of the Coleman Generation Station is required by any Governmental Authority with jurisdiction for reliability.

3.4 Subsequent SSR Agreement Relating to Coleman Generation Station. Subsequent to the period of the Initial SSR Agreement and following the idling of any unit of the Coleman Generation Station, if the Load of the Hawesville Smelter above the amount of the Base Load plus, if applicable, the amount of the Curtailable Load and thereby creates the need for a SSR Agreement as determined by the applicable RTO or ISO and, as a consequence of such increase, any RTO or ISO orders Big Rivers to restart, operate, maintain, and dispatch or make available any unit of the Coleman Generation Station for reliability purposes, then unless Century operates the Hawesville Smelter at the Base Load and, if applicable, the Curtailable Load, Century shall pay Big Rivers for all of the resulting SSR Costs incurred by Big Rivers, in accordance with Section 4, including all of the resulting capital costs incurred to restart any affected unit of the Coleman Generation Station and all of the resulting capital Costs incurred after the date of such restart, charged by the applicable RTO or ISO, as if Century had requested that Big Rivers enter into a SSR Agreement with the applicable RTO or ISO under the Tariff with respect to any unit of the Coleman Generation Station.

3.5 Modification of SSR Agreement. If Big Rivers restarts one or more of the Coleman Generation Station units for its own purpose while an SSR is in effect, Big Rivers will request MISO to modify the SSR agreement to eliminate the SSR status of the equivalent

number of units. (Example: if two Coleman units are designated as SSR units and Big Rivers starts one Coleman Generation Station unit for its own purpose, Big Rivers would request MISO to amend the SSR Agreement to designate only one Coleman Generation Station unit as an SSR unit).

3.6 Alternative RTO or ISO.

(a) This Agreement and the other Transaction Documents have been drafted by the Parties and Kenergy under the presumption that, during the Service Period, the Hawesville Node is located in MISO and Big Rivers is a member of MISO. If the Coleman Substation and the Hawesville Node are not located within the same RTO or ISO during the Service Term, then the Parties agree to modify in good faith the terms and provisions of this Agreement and any other Transaction Documents to the extent necessary to preserve the purposes and intent of the Transaction Documents.

(b) Century acknowledges and agrees that Kenergy or Big Rivers, as applicable, may, in its sole discretion, elect to join or become a member of a new RTO or ISO or elect to withdraw and not be a member of any RTO or ISO. The Hawesville Node may remain in MISO if (i) requested by Century, (ii) permitted by MISO and the new RTO or ISO, (iii) Century is responsible for any costs resulting from the Hawesville Node remaining in MISO, and (iv) Big Rivers is not unreasonably precluded by the request from leaving MISO and joining or becoming a member of a different RTO or ISO or not being a member of any RTO or ISO. In each such case, any terms used herein that relate to MISO or the MISO Tariff shall be deemed amended, as applicable, to incorporate the correlative terms with respect to the new RTO or ISO or applicable tariff. If necessary, the Parties agree to modify in good faith the terms and provisions of the Transaction Documents to conform them to the extent necessary to the requirements of the new RTO or ISO or the withdrawal of Kenergy or Big Rivers from any RTO or ISO and otherwise amend them in the manner necessary to preserve the purposes and intent of the Transaction Documents.

(c) Big Rivers shall (i) provide Century one year's notice before leaving MISO; (ii) provide Century with notice of a recommendation by Big Rivers' management to Big Rivers' board of directors that Big Rivers terminate its membership in MISO (subject to any applicable confidentiality restrictions) promptly after the date the recommendation is made; (iii) if not publicly available, provide Century with a copy of the annual report required by the Kentucky Public Service Commission regarding the cost and benefit to Big Rivers of being a member in MISO (subject to any applicable confidentiality restrictions); and (iv) allow Century to participate in meetings or conference calls with MISO regarding matters affecting amounts payable by Century relating to leaving MISO.

(d) Century acknowledges and agrees if (i) Kenergy or Big Rivers, as applicable, in its sole discretion, elects to join or become a member of a new RTO or ISO or elects to withdraw and not become a member of any RTO or ISO, and (ii) Century is not permitted by either MISO or the new RTO or ISO to remain in MISO, then Century will be responsible for all costs associated with Century's exit from MISO, including any fees charged by MISO as a result of the exit.

3.7 Acknowledgement. Century acknowledges and agrees that Big Rivers has no obligation to serve or supply any Electric Services from System Resources for the benefit of all or a portion of the Hawesville Smelter or any Affiliates, spin-offs or successors of Century during the Service Period or thereafter; *provided*, that Century Parent or an affiliate of Century may seek a contractual service arrangement with Big Rivers, through Kenergy, with respect to the Sebree smelter.

3.8 Century Credit Support. Century shall provide and maintain credit support, at Big Rivers' election, in the form of one of the following, as selected by Century: (i) a letter of credit from a bank rated "A+" or higher, (ii) cash collateral subject to security arrangements in form and substance satisfactory to Big Rivers in its sole discretion or (iii) other credit support acceptable to Big Rivers in its sole discretion, in each case, in an amount equal to the sum of the following without duplication either in this Agreement or with regard to the Electric Service Agreement or any Market Agreement:

(a) amounts reasonably estimated by Big Rivers to become due and payable to Big Rivers under this Agreement during the two succeeding months; and

(b) the amount (without duplication) of any credit support required to be provided and maintained under Section 14.3 of the Electric Service Agreement for the benefit of Big Rivers.

Century shall provide any credit support required by this Section to the Person designated by Big Rivers and Kenergy but Century shall not be required to post credit support to more than one Person with respect to the same underlying liability.

3.9 Additional Credit Support. Century shall provide and maintain additional credit support in the form required by any RTO or ISO and in the amount (a) determined by Big Rivers prior to termination of the Arrangement Agreement or, if after such termination, Kenergy with respect to the provision of Electric Services for resale to Century and (b) required under any Bilateral Contract for the purchase by Kenergy of any Electric Services for resale to Century, without the requirement for Big Rivers to provide credit support or be liable to the Bilateral Counterparty.

3.10 Right to Transmission Services. Notwithstanding any other provision in this Agreement or any Transaction Document, Big Rivers acknowledges and agrees that Century (through Kenergy or the Market Participant) shall be entitled to Transmission Services, on the same rates, terms and conditions as other transmission customers pursuant to the Tariff.

3.11 Audit Rights. Big Rivers will permit Century to audit, upon reasonable notice, at Century's own expense, at a mutually agreeable time, all information in the possession of Big Rivers relating to Big Rivers' service under the Arrangement Agreement to Kenergy for resale to Century, including scheduled deliveries, meter records, billing records, records related to payments to Big Rivers and such other documents related to payment for and determination of the amount of Electric Services supplied by Big Rivers and delivered to Kenergy for resale and delivery to Century. Big Rivers shall retain all documentation applicable to service to Kenergy

under the Arrangement Agreement for a period of three years. Nothing in this Section shall obligate Big Rivers to provide attorney-client privileged information.

3.12 Imbalance Energy Limit. Century acknowledges and agrees that it will not consume more than 10 MW of energy above the Base Load plus, if applicable, the Curtailable Load.

3.13 Transmission Charges. The Parties acknowledge and agree that delivery of Electric Services from the Delivery Point to the Century Substation is network integration transmission service and Big Rivers will not charge any supplemental amount in addition to the charge for network integration transmission service for delivery of Electric Services to the Delivery Point for the transmission of Electric Services from the Delivery Point to the Century Substation.

3.14 Assignment of the Hawesville Node. Big Rivers shall transfer the Hawesville Node to any Person succeeding Big Rivers as the Market Participant.

4. Direct Payment Obligations.

4.1 Century shall pay Big Rivers all amounts owing to Big Rivers under this Agreement (the "Direct Payments") including, without duplication either within this Agreement or with regard to the Electric Service Agreement or any Market Agreement, the following:

(a) All SSR Costs incurred by Big Rivers, including under any regulation, order, directive or policy of a RTO or ISO that would be substantively similar to an SSR Agreement if the provisions of such regulation, order, directive or policy were implemented in an agreement with the RTO or ISO, and whether or not any SSR Agreement is then in effect or approved by any Governmental Authority, together with any Costs, including new capital expenditures (except to the extent provided in clause (iii) below), of Big Rivers when the operation of such units of the Coleman Generation Station is required for reliability if Century's Load exceeds the Base Load plus, if applicable, the Curtailable Load, including any such Costs that are not reimbursed as SSR Costs, subject to the following:

(i) Century shall not be obligated to pay Big Rivers any SSR Costs to the extent that (A) Century pays any such costs under the Electric Service Agreement to or for the benefit of the applicable RTO or ISO and (B) such applicable RTO or ISO then credits such amounts to Big Rivers and Big Rivers receives such amounts either directly in the form of a payment to Big Rivers or indirectly as a credit to amounts otherwise owing by Big Rivers to the applicable RTO or ISO on a statement of the applicable RTO or ISO;

(ii) The amount payable by Century for SSR Costs for any Billing Month shall be reduced by:

(I) revenues received by Big Rivers for Transmission Services for such Billing Month paid by Century directly or indirectly under the Tariff, including revenues paid by Century which are received by Big Rivers pursuant to Subsection 4.1(a)(i), and

(2) revenues received from other Persons based on allocations of responsibility for the related SSR Costs by an RTO or ISO;

If the portion of the Direct Payment relating to this Subsection (a) is negative as a result of the offsets in clauses (1) and (2) above, then such offsets will be carried forward and applied as a credit against any future SSR Costs. Any accumulated offsets or credits accruing pursuant to this Subsection 4.1(a)(ii) shall be reduced to zero at the time of the termination or expiration of the SSR Agreement. Big Rivers shall thereafter have no obligation to pay to Century any offsets or credits accruing under this Subsection 4.1(a)(ii), except as provided in Subsection 4.1(a)(iv) below.

(iii) The portion of the SSR Costs for the Initial SSR Agreement relating to scheduled capital expenditures for the period from September 1, 2013 to May 30, 2014 will be based on the budget approved by MISO. Such budget shall exclude capital and labor costs associated with an outage of Unit 1 of the Coleman Generation Station if MISO designates only two or fewer units of the Coleman Generation Station as required to operate for reliability purposes. If applicable, any capital or other costs associated with the planned maintenance of Unit 1 will be budgeted no earlier than October 2013. "Capital costs" shall mean any costs required to be capitalized pursuant to applicable Accounting Principles.

(iv) After termination of the Initial SSR Agreement, Big Rivers will credit to the next invoice to Century hereunder amounts received from other Persons for their allocated responsibility for SSR Costs but that Century previously paid to Big Rivers and that would otherwise result in duplicate recovery by Big Rivers of such amounts. If the amount to be refunded exceeds the next invoice issued hereunder, then Big Rivers shall refund such unapplied credit to Century.

(b) For the avoidance of doubt and notwithstanding any other provision herein, Century shall not be charged any SSR Costs or other Costs related to the Coleman Generation Station, if (i) Century operates at or below the Base Load plus, if applicable, the Curtailable Load; (ii) MISO terminates the SSR Agreement; or (iii) Big Rivers continues operations or restarts operations of any units of the Coleman Generation Station such that the operation of no additional units of the Coleman Generation Station are required to support system reliability under an SSR Agreement.

(c) Century shall pay or reimburse Big Rivers for the Costs referred to in Sections 3.6(b)(iii) and 3.6(d) for which Century is responsible only to the extent these charges are charged by MISO to Big Rivers. Currently it is understood that these charges will be charged to the Market Participant.

(d) Century shall reimburse Big Rivers for all other third-party, out of pocket Costs of Big Rivers incurred or committed to by Big Rivers related to the operation of the Hawesville Smelter.

4.2 Monthly Invoices. Big Rivers shall bill Century on or before the fifteenth Business Day of each Billing Month for the payments and charges due and payable by Century hereunder by delivery of a monthly invoice reflecting the payments and charges that accrued

during the preceding month and unpaid amounts from prior monthly statements. Century shall pay Big Rivers such amounts in immediately available funds to an account designated by Big Rivers on the Business Day following the 24th day of the month following the Billing Month.

4.3 Default Interest. If any monthly invoice rendered by Big Rivers to Century is not paid on the due date, interest will accrue and become payable by Century to Big Rivers on all unpaid amounts at a rate of one percentage point over the Prime Rate commencing on the first day after the due date and accruing on each day thereafter until the date such payment is made.

4.4 Payments Under Protest; No Waiver. If any portion of any monthly invoice hereunder is disputed by Century, Century shall pay the disputed amount, under protest, when due. If the disputed amount of the payment is found to be incorrect, Big Rivers shall promptly cause to be refunded to Century the amount that was not then due and payable, together with interest at the Prime Rate commencing on the first day after the date of payment and accruing on each day thereafter until the date the refund is made. No payment made by Century pursuant to this Section shall constitute a waiver of any right of Century to contest the correctness of any charge or credit reflected in a Big Rivers' invoice.

4.5 Acknowledgements Regarding Payment Term. Century acknowledges and agrees that Big Rivers shall be entitled to Direct Payments without regard to the status or effectiveness of the Electric Service Agreement, the Arrangement Agreement or any other Transaction Document.

5. Cure Rights.

5.1 Notwithstanding any provision contained in the Electric Service Agreement that affords Century the right to terminate the Electric Service Agreement upon any breach or default by Kenergy thereunder, Century shall provide Big Rivers a reasonable opportunity, exercisable in Big Rivers' sole discretion, to cure any such breach or default by Kenergy prior to exercising such termination rights, which opportunity shall extend, at a minimum, for a period of not less than 10 Business Days after the later of (i) the date of expiration of the applicable period of time (if any) available for a cure by Kenergy under the Electric Service Agreement, and (ii) the date on which notice of the breach or default by Kenergy is delivered by Century to Big Rivers. Century hereby consents to any attempt by Big Rivers to cure any breaches or defaults by Century under the Electric Service Agreement that may hereafter occur; *provided*, that Big Rivers does not materially interfere with Century's attempts (if any) to so cure such breaches or defaults.

5.2 Notwithstanding any provision contained in the Arrangement Agreement that affords Big Rivers the right to terminate the Arrangement Agreement upon any breach or default by Kenergy thereunder, Big Rivers shall provide Century a reasonable opportunity, exercisable in Century's sole discretion, to cure any such breach or default by Kenergy prior to exercising such termination rights, which opportunity shall extend, at a minimum, for a period of not less than ten Business Days after the later of (i) the date of expiration of the applicable period of time (if any) available for a cure by Kenergy under the Arrangement Agreement, and (ii) the date on which notice of the breach or default by Kenergy is delivered by Big Rivers to Century.

Big Rivers hereby consents to any attempt by Century to cure any breaches or defaults by Big Rivers under the Arrangement Agreement that may hereafter occur; *provided*, that Century does not materially interfere with Big Rivers' attempts (if any) to so cure such breaches or defaults.

6. Representations and Warranties.

6.1 Big Rivers. Big Rivers hereby represents and warrants to Century as follows:

(a) Big Rivers is an electric generation and transmission cooperative corporation duly organized and validly existing and in good standing under the laws of the Commonwealth of Kentucky, and has the power and authority to execute and deliver this Agreement and the Arrangement Agreement, to perform its obligations hereunder and thereunder, and to carry on its business as it is now being conducted and as it is contemplated hereunder to be conducted during the term hereof.

(b) Subject to Section 6.1(c), this Agreement, the Arrangement Agreement and other agreements entered into by Big Rivers in connection therewith constitute Big Rivers' valid and binding obligation enforceable against it in accordance with their terms, except as enforceability may be affected by bankruptcy, insolvency or other similar laws affecting creditors' rights generally and by general equitable principles. The execution, delivery and performance of this Agreement and the Arrangement Agreement by Big Rivers have been duly and effectively authorized by all requisite corporate action.

(c) As of the Effective Date, all consents, approvals, authorizations, actions or orders, including without limitation, those that must be obtained from Governmental Authorities and the RUS, required for its authorization, execution and delivery of, and for the consummation of the transactions contemplated by, this Agreement and the Arrangement Agreement have been obtained other than as may be required under Applicable Law to be obtained, given, accomplished or renewed at any time or from time to time, and that are routine in nature or that cannot be obtained, or are not normally applied for, prior to the time they are required and that Big Rivers has no reason to believe will not be timely obtained.

(d) Subject to Section 6.1(c), its execution and delivery of this Agreement and the Arrangement Agreement, its consummation of the transactions contemplated by this Agreement and the Arrangement Agreement, and its fulfillment of and compliance with the terms and provisions hereof and thereof do not conflict with or violate any judicial or administrative order, award, judgment or decree applicable to it, or conflict with any of the terms, conditions or provisions of its Articles of Incorporation or Bylaws or any material instrument, mortgage, agreement, contract or restriction to which it is a party, or by which any of its properties are bound, or require the approval, consent or authorization of any federal, state or local court, or any of its creditors, or of any other Person, or give any party with rights under any such instrument, agreement, contract, mortgage, judgment, award, order or other restriction the right to terminate, modify or otherwise change its rights or obligations thereunder that has not been obtained.

6.2 Century. Century hereby represents and warrants to Big Rivers as follows:

(a) Century is a general partnership duly organized and validly existing and in good standing under the laws of the Commonwealth of Kentucky and is authorized to do business in the Commonwealth of Kentucky, and has the power and authority to execute and deliver this Agreement, to perform its obligations hereunder, and to carry on its business as it is now being conducted and as it is contemplated hereunder to be conducted during the term hereof.

(b) This Agreement, the Electric Service Agreement and other agreements entered into by Century in connection therewith constitute Century's valid and binding obligation enforceable against it in accordance with their terms, except as enforceability may be affected by bankruptcy, insolvency or other similar laws affecting creditors' rights generally and by general equitable principles. The execution, delivery and performance of this Agreement and the Electric Service Agreement by Century have been duly and effectively authorized by all requisite partner action.

(c) All consents, approvals, authorizations, actions or orders, including without limitation, those that must be obtained from governmental agencies or authorities, required for its authorization, execution and delivery of, and for the consummation of the transactions contemplated by, this Agreement and the Arrangement Agreement have been obtained.

(d) Its execution and delivery of this Agreement and the Electric Service Agreement, its consummation of the transactions contemplated by this Agreement and the Electric Service Agreement, and its fulfillment of and compliance with the terms and provisions hereof and thereof do not conflict with or violate any judicial or administrative order, award, judgment or decree applicable to it, or conflict with any of the terms, conditions or provisions of its partnership agreement or any material instrument, mortgage, agreement, contract or restriction to which it is a party, or by which any of its properties are bound, or require the approval, consent or authorization of any federal, state or local court, or any of its creditors, or of any other Person, or give any party with rights under any such instrument, agreement, contract, mortgage, judgment, award, order or other restriction the right to terminate, modify or otherwise change its rights or obligations thereunder that has not been obtained.

7. Indemnification. In addition to any and all rights of reimbursement, indemnification, subrogation or any other rights pursuant to this Agreement or under law or in equity, Century hereby agrees that it will pay, and will protect, indemnify, and hold harmless Big Rivers and each of its respective designees, agents and contractors (each, an "Indemnified Person"), on an after-tax basis, from and against (and will reimburse each Indemnified Person as the same are incurred for) any and all losses, claims, damages, liabilities or other expenses (including, to the extent permitted by Applicable Law, the reasonable fees, disbursements and other charges of counsel but not including the expenses incurred by Big Rivers in connection with the preparation, negotiation, execution and delivery of this Agreement) to the extent not recovered under the Arrangement Agreement and to which such Indemnified Person may become subject arising out of or relating to any or all of the following (each, an "Indemnified Liability"): (a) the purchase and transmission of electricity, electric capacity or electrical

ancillary services to the Delivery Point for resale to Century, (b) Bilateral Contracts, to which Century has agreed, for the purchase of electricity, electric capacity or electricity-related ancillary services for resale to Century, (c) any other amounts due and owing to Big Rivers under the Transaction Documents, or (d) any actual or prospective claim, litigation, investigation or proceeding relating to any of the foregoing, whether based on contract, tort or any other theory, whether brought by any third party or by Century or otherwise, and regardless of whether any Indemnified Person is a party thereto, such items (a) through (d) including, to the extent permitted by Applicable Law, the fees of counsel selected by such Indemnified Person incurred in connection with any investigation, litigation or other proceeding or in connection with enforcing the provisions of this Section 7. Any claims under this Section 7 in respect of any Indemnified Liabilities are referred to herein, collectively, as "Indemnity Claims". No Indemnified Person shall be obliged to pursue first any recovery under any other indemnity or reimbursement obligation before seeking recovery under the indemnification and reimbursement obligations of Century under this Agreement.

7.1 Payments.

(a) All sums paid and costs incurred by any Indemnified Person with respect to any matter indemnified hereunder shall bear interest at the Prime Rate, and all such sums and costs shall be immediately due and payable on demand. Each such Indemnified Person shall promptly notify Century in a timely manner of any such amounts payable by Century hereunder; *provided*, that any failure to provide such notice shall not affect Century's obligations under this Section 7.

(b) Any amounts payable by Century pursuant to this Section 7 shall be payable within the later to occur of (i) ten (10) Business Days after Century receives an invoice for such amounts from any applicable Indemnified Person, and (ii) five (5) Business Days prior to the date on which such Indemnified Person expects to pay such costs on account of which Century's indemnity hereunder is payable, and if not paid by such applicable date shall bear interest at the Prime Rate from and after such applicable date until paid in full.

7.2 Survival. The provisions of this Section 7 shall survive termination of this Agreement, and shall be in addition to any other rights and remedies of any Indemnified Person.

7.3 Subrogation. Upon payment of any Indemnity Claim by Century pursuant to this Section 7, Century, without any further action, shall be subrogated to any and all claims that the applicable Indemnified Person may have relating thereto, and such Indemnified Person shall at the request and expense of Century cooperate with Century and give at the request and expense of Century such further assurances as are necessary or advisable to enable Century vigorously to pursue such claims.

8. Miscellaneous.

8.1 Entire Agreement; Amendments; No Reliance. This Agreement, the Electric Service Agreement, the Arrangement Agreement and the other Transaction Documents constitute the entire agreement of the Parties hereto with respect to the subject matter hereof and supersede all prior agreements, whether oral or written. This Agreement may be amended only

by a written document signed by each of the Parties hereto. Each Party acknowledges that it has not relied upon any representations, statements or warranties of the other Party in executing this Agreement except for those representations and warranties expressly set forth in the foregoing documents.

8.2 Waiver. The waiver by either Party of any breach of any term, covenant or condition contained herein will not be deemed a waiver of any other term, covenant or condition, nor will it be deemed a waiver of an subsequent breach of the same or any other term, covenant or condition contained herein.

8.3 Notices. A notice, consent, approval or other communication under this Agreement must be delivered in writing, addressed to the Person to whom it is to be delivered, and must be (a) personally delivered to that Person's address (which will include delivery by a nationally recognized overnight courier service), or (b) transmitted by facsimile to that Person's address, with a duplicate notice sent by a nationally recognized overnight courier service to that Person's address. A notice given to a Person in accordance with this Section will be deemed to have been delivered (i) if personally delivered to a Person's address, on the day of delivery if such day is a Business Day, or otherwise on the next Business Day, or (ii) if transmitted by facsimile to a Person's facsimile number and a correct and complete transmission report is received, or receipt is confirmed by telephone, on the day of transmission if a Business Day, otherwise on the next Business Day; *provided, however*, that such facsimile transmission will be followed on the same day with the sending to such Person of a duplicate notice by a nationally recognized overnight courier to that Person's address. For the purpose of this Section, the address of a Party is the address set out below or such other address that that Party may from time to time deliver by notice to the other Party in accordance with this Section:

If to Big Rivers:
Big Rivers Electric Corporation
201 Third Street
Henderson, Kentucky 42420
Attn: President and CEO
Fax: (270) 827-2558

If to Century:
Century Aluminum Company
P.O. Box 500
State Route 271 North
Hawesville, Kentucky 42348
Attn: Plant Manager
Fax: (270) 852-2882

With copy to:
Century Aluminum Company
One South Wacker Drive
Suite 1000
Chicago, Illinois 60606
Attn: General Counsel
Fax: (312) 696-3102

8.4 Dispute Resolution.

(a) Resolution Meetings. If a dispute arises concerning the terms or conditions of this Agreement, the duties or obligations of the Parties or the implementation, interpretation or breach thereof, either Party may request a meeting among authorized representatives of the other Party to discuss and attempt to reach a resolution of the dispute. Such meeting will take place within 10 days or such shorter or longer time as agreed upon by the Parties. Nothing in this Section 8.4 shall toll or extend the cure period with respect to the failure by a Party to perform its obligations under this Agreement.

(b) Arbitration Generally. Absent resolution of the dispute pursuant to Section 8.4(a), and subject to a minimum amount in controversy of $100,000.00, the Parties will submit the matter to be settled, subject to Section 8.7, by binding arbitration by a tribunal of three (3) arbitrators constituted and acting under the International Arbitration Rules (the "AAA Rules") then in effect of the ICDR of the American Arbitration Association, in accordance with the following terms and conditions:

(i) In the event of any conflict between the AAA Rules and the provisions of this Agreement, the provisions of this Agreement shall apply.

(ii) The ICDR shall administer the arbitration.

(iii) The seat of the arbitration shall be Henderson, Kentucky, unless otherwise agreed by the Parties, and the fact that hearings are held elsewhere shall not affect the seat of arbitration

(c) Arbitration Procedures. The following procedures shall govern the selection of arbitrators.

(i) The claimant Party or Parties shall appoint one arbitrator in accordance with the AAA Rules, the respondent Party or Parties shall appoint one arbitrator in accordance with the AAA Rules within thirty (30) days after the appointment of the first arbitrator, and the two arbitrators so appointed shall appoint the third (and presiding) arbitrator in accordance with the AAA Rules within thirty (30) days after the appointment of the second arbitrator.

(ii) In the event of an inability by the two party-nominated arbitrators to agree on an arbitrator in accordance with Section 8.4(c)(i) the appointing authority for the third arbitrator shall be the ICDR, acting in accordance with such rules as it may adopt for such purpose. The ICDR shall use its best efforts to appoint such third arbitrator within thirty (30) days of an application being made for such purpose.

(iii) Notwithstanding Sections 8.4(c)(i) and 8.4(c)(ii), each arbitrator selected pursuant to this Section 8.4(c) shall have substantial experience in the electric utility sector, and shall not have been employed by, a consultant to or received compensation from any Party in the past.

(d) Remedies and Relief.

(i) The arbitration tribunal shall have the power to grant any remedy or relief that it deems just and equitable and that is in accordance with the terms of this Agreement, including specific performance and injunctive relief, whether interim or final. Any such relief and any interim, provisional or conservatory measure ordered by the arbitral tribunal may be specifically enforced by any court of competent jurisdiction.

(ii) The losing Party shall pay the fees and costs of the prevailing Party.

(iii) The award of the arbitral tribunal shall be subject to appeal to, or requests for rehearing by, a court in accordance with Section 8.7.

(iv) The award of the tribunal may be enforced by any court of competent jurisdiction and may be executed against the person and assets of the losing Party in any competent jurisdiction. For the avoidance of doubt, the Parties acknowledge and agree that a court of any jurisdiction where the assets of a Party against which enforcement is sought may be found, or a court that has subject matter jurisdiction over any proceeding to confirm or enhance the award, is a court of competent jurisdiction and venue, and the Parties irrevocably consent to the exercise of personal jurisdiction in any such court, and irrevocably waive any claim that any such jurisdiction is an inconvenient forum.

(e) Except for arbitration proceedings pursuant to this Section 8.4, no action, lawsuit or other proceeding (other than proceedings for the confirmation or enforcement of an arbitration award, an action to compel arbitration or an application for interim, provisional or conservatory measures in connection with the arbitration, or to obtain documentary or testimonial evidence) shall be brought by or between the Parties in connection with any dispute; provided, that, where delay in doing so could result in irreparable harm, each Party to the arbitration proceeding retains the right to seek interim, provisional or conservatory measures through the courts in accordance with Section 8.7, and any such request shall not be deemed incompatible with this Agreement to arbitrate or constitute a waiver of the right to arbitrate.

(f) Notwithstanding anything else herein to the contrary, any final decision of an RTO or ISO regarding amounts payable hereunder shall be binding on the Parties. The Parties acknowledge and agree that Century shall be responsible for pursuing any challenge to any amounts an RTO or ISO charges to a Market Participant or Kenergy that directly or indirectly is charged to Century.

8.5 Assignments and Transfers. No Party shall assign any of its rights or obligations under this Agreement, whether by operation of law or otherwise, without the prior written consent of the other Party, *provided, however*, that no prior consent shall be required with respect to an assignment to any person who is a permitted assignee of Century pursuant to and in accordance with the Electric Service Agreement or a permitted assignee of Big Rivers pursuant to and in accordance with the Arrangement Agreement. No assignment by Century pursuant to the preceding sentence shall relieve or release Century of or from its obligations under or with respect to this Agreement without the consent of Big Rivers, which consent will be granted in its

sole discretion. Either Party may, without the approval of the other Party, assign this Agreement as collateral security or grant one or more mortgages (including one or more deeds of trust or indentures) on or security interests in its interest under this Agreement in connection with the general financing of its assets or operations.

8.6 Governing Law. This Agreement shall be interpreted, governed by and construed under the laws of the Commonwealth of Kentucky, without regard to its conflicts of law rules.

8.7 Jurisdiction. The Parties hereby agree that the courts of the Commonwealth of Kentucky will have exclusive jurisdiction over each and every judicial action brought under or in relationship to this Agreement, *provided* that the subject matter of such dispute is not a matter reserved by law to the KPSC, or to the U.S. federal judicial system (in which event exclusive jurisdiction and venue will lie with the U.S. District Court for the Western District of Kentucky), and the Parties hereby agree to submit to the jurisdiction of Kentucky courts for such purpose. Venue in state court actions will be in the Henderson Circuit Court as the court in which venue will lie for the resolution of any related disputes under this Agreement. Each Party hereby irrevocably waives, to the fullest extent permitted by Applicable Law, any objection that it may now or hereafter have to the laying of venue of any action, suit or proceeding as provided in this Section and any claim that such action, suit or proceeding brought in accordance with this Section has been brought in an inconvenient forum. Nothing in this paragraph prohibits a Party from referring to FERC or any other Governmental Authority any matter properly within its jurisdiction. In any proceeding hereunder, each Party irrevocably waives, to the fullest extent allowed by law, its right, if any, to trial by jury. For the avoidance of doubt, each Party hereby agrees to accept service of any papers or process in any arbitration under Section 8.4, or any action or proceeding arising under or relating to such arbitration, at the address set forth in Section 8.3, and agrees that such service shall be, for all purposes, good and sufficient.

8.8 Good Faith Efforts. The Parties agree that each will in good faith take all reasonable actions within their reasonable control as are necessary to permit the other Party to fulfill its obligations under this Agreement and the other Transaction Documents to which it is a party; *provided* that no Party will be obligated to expend money or incur material economic loss in order to facilitate performance by the other Party. Where the consent, agreement, or approval of either Party must be obtained hereunder, such consent, agreement or approval may not be unreasonably withheld, conditioned, or delayed unless otherwise provided herein. Where either Party is required or permitted to act or fail to act based upon its opinion or judgment, such opinion or judgment may not be unreasonably exercised. Where notice to the other Party is required to be given herein, and no notice period is specified, reasonable notice shall be given.

8.9 Successors and Assigns. This Agreement shall be binding upon, and shall inure to the benefit of and be enforceable by, the Parties and their respective successors and permitted assigns.

8.10 Headings. The headings contained in this Agreement are solely for convenience and do not constitute a part of the agreement between the Parties, nor should such headings be used to aid in any manner in the construction of this Agreement.

8.11 Third-Party Beneficiaries. Nothing in this Agreement may be construed to create any duty to, or standard of care with reference to, or any liability to, or any benefit for, any person not a Party to this Agreement, other than Kenergy which shall be a third party beneficiary hereof.

8.12 Kenergy Obligations Separate. Nothing contained in this Agreement shall obligate Century or Big Rivers for any obligations or liabilities of Kenergy, whether under or pursuant to the Electric Service Agreement, the Arrangement Agreement or otherwise.

8.13 No Direct Service. The Parties acknowledge that Big Rivers and Kenergy are entering into the Arrangement Agreement and Century and Kenergy are entering into the Electric Service Agreement which agreements contain the terms and conditions setting forth the wholesale arrangement and procurement of power by Big Rivers and the purchase of such power by Kenergy, and the corresponding retail sale of such power by Kenergy and the purchase of such power by Century. Nothing contained in this Agreement shall be deemed to be or create an agreement or commitment of Big Rivers to sell directly to Century, or an agreement of Century to directly purchase from Big Rivers, any Electric Services.

[Signatures Follow on Next Page]

IN WITNESS WHEREOF, this Agreement is hereby executed as of the day and year first above written.

BIG RIVERS ELECTRIC CORPORATION

By: Mark A. Bailey
Name: Mark A. Bailey
Title: President and Chief Executive Officer

CENTURY ALUMINUM OF KENTUCKY
GENERAL PARTNERSHIP
By: METALSCO LLC, its Managing Partner

By: Sean M. Byrne
Name: Sean M. Byrne
Title: Hawesville Plant Manager

EXHIBIT A
ALLOCATION OF SPECIFIED COSTS

Provided as Illustration only, not guaranteed to be an all-inclusive list and subject to change as the basis for charges to Big Rivers change:

1. ACES Fee – Pro-rata share of Big Rivers' total sales, only to extent Century sales are included in fee calculation.
2. North American Transmission Forum – Pro-rata share of Big Rivers' Local Balancing Authority load (LESS HMPL), only to extent Century load is included in fee calculation.
3. NERC - Pro-rata share of Big Rivers' Local Balancing Authority load (LESS HMPL), only to extent Century load is included in fee calculation.
4. NRCO – Cost Differential between organization classification, if applicable, due to Century's inclusion in Big Rivers' total sales, only to extent Century sales are included in fee calculation.
5. NRECA - Pro-rata share of Big Rivers' total sales, only to extent Century sales are included in fee calculation.
6. Public Service Commission – Pro-rata share of Big Rivers' intra-Kentucky revenue, only to extent Century revenues are included in fee calculation.
7. SERC - Pro-rata share of Big Rivers' Local Balancing Authority load (LESS HMPL), only to extent Century load is included in fee calculation.
8. EPA Title V Permit Fees – Tons of emissions related to Coleman Station during SSR operation.
9. KAEC – Pro-rata share of Big Rivers' total sales, only to extent Century sales are included in fee calculation.
10. KPSC Rate Casts – Century will not be charged costs for Big Rivers rate cases with the KPSC.

EXHIBIT A-2

Execution Version

PROTECTIVE RELAYS AGREEMENT

Dated as of August 12, 2013

by and among

BIG RIVERS ELECTRIC CORPORATION,

KENERGY CORP.

and

CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

PROTECTIVE RELAYS AGREEMENT

This PROTECTIVE RELAYS AGREEMENT ("Agreement") is made and entered into as of August 12, 2013, by and among BIG RIVERS ELECTRIC CORPORATION, a Kentucky electric generation and transmission cooperative ("Big Rivers"), KENERGY CORP., a Kentucky electric cooperative corporation ("Kenergy"), and CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP, a Kentucky general partnership ("Century"). Big Rivers, Kenergy and Century are sometimes referred to herein collectively as the "Parties" and individually as a "Party."

RECITALS

A. Century owns and operates an aluminum reduction plant in Hawesville, Kentucky and purchases electric services pursuant to a Retail Electric Service Agreement, dated July 1, 2009, with Kenergy (the "Existing Agreement").

B. Century issued a notice of termination with respect to the Existing Agreement, effective as of August 20, 2013.

C. To facilitate entry into new electric service arrangements intended to be effective upon termination of the Existing Agreement (the "Transaction"), the Parties desire to enter into this Agreement to set forth the Parties' respective rights and obligations relating to protective relays and related equipment more particularly described in Exhibit A hereto (the "Protective Relays").

D. Century intends that the Protective Relays will support curtailment of Century's requirements for electric services, in certain circumstances, served under an Electric Service Agreement to be entered into between Century and Kenergy (the "Electric Service Agreement") as part of the Transaction.

E. In satisfaction of the condition of Big Rivers and Kenergy set forth herein to the effectiveness of this Agreement, Century Aluminum Company, a Delaware corporation and the indirect owner of Century ("Guarantor"), is entering into a Guarantee, dated as of the date hereof, for the benefit of Big Rivers and Kenergy ("the "Guarantee"), guaranteeing to Big Rivers and Kenergy the payment, performance and all other obligations of Century arising out of or relating to this Agreement.

AGREEMENT

NOW, THEREFORE, in consideration of the premises and the mutual covenants hereinafter set forth, the Parties, intending to be legally bound, hereby covenant and agree as follows:

ARTICLE 1

DEFINITIONS; RULES OF INTERPRETATION

1.1 Definitions. Capitalized terms when used in this Agreement have the meanings specified herein, including the definitions provided in this Section 1.1, unless stated otherwise or the context requires otherwise.

1.1.1 AAA Rules: As defined in Section 6.4.2.

1.1.2 Accounting Principles: Generally accepted accounting principles consistently applied or, if generally accepted accounting principles in accordance with the uniform system of accounts of an applicable Governmental Authority or RUS are required, the generally accepted accounting principles consistently applied in accordance with such uniform system of accounts, each as in effect from time to time.

1.1.3 Agreement: As defined in the preamble to this Agreement.

1.1.4 Applicable Law: All laws, statutes, codes, treaties, ordinances, judgments, decrees, injunctions, writs, orders, rules, regulations, interpretations, issuances, enactments, decisions, authorizations, permits or directives of any Governmental Authority having jurisdiction over the matter in question.

1.1.5 Approval: Any valid waiver, exemption, declaration, variance, franchise, permit, authorization, approval, consent, lease, ruling, tariff, rate, certification, license or similar order of or from, or filing or registration with, or notice to, or other action by, any Governmental Authority with jurisdiction over the matter in question.

1.1.6 Arrangement Agreement: An Arrangement and Procurement Agreement, to be entered into by Kenergy and Big Rivers, to facilitate Big Rivers' obtainment of electric energy and related services from the wholesale electric market including pursuant to bilateral contracts, for resale to Kenergy, for delivery to Century under the Electric Service Agreement.

1.1.7 Big Rivers: As defined in the preamble to this Agreement.

1.1.8 Business Day: Mondays through Fridays of each week except legal holidays established by federal law in the United States of America or state law in the Commonwealth of Kentucky.

1.1.9 Century: As defined in the preamble to this Agreement.

1.1.10 Dispute: Any and all disputes, controversies and claims between or among the Parties and arising under, relating to or in connection with, this Agreement, in any manner whatsoever, whether in contract, in tort, or otherwise, and including any dispute or controversy regarding the existence, validity or enforceability of this Agreement, and whether brought by a Party or any of its parents, subsidiaries, affiliates, officers, directors or agents on the one hand, against a Party or any of its parents, subsidiaries, affiliates, officers, directors or agents, on the other hand.

1.1.11 Electric Service Agreement: As defined in the Recitals.

1.1.12 Existing Agreement: As defined in the Recitals.

1.1.13 FERC: Federal Energy Regulatory Commission.

1.1.14 Good Utility Practice: Any of the practices, methods, and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period; or any of the practices, methods, and acts that, in the exercise of reasonable judgment in light of the facts known at the time a decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather to be any and all generally accepted practices, methods, or acts.

1.1.15 Governmental Authority: Any international, national, federal, state, territorial, local or other government, or any political subdivision thereof, and any governmental, judicial, public or statutory instrumentality, tribunal, agency, authority, body or entity having legal jurisdiction over the matter or Person in question, a RTO (including MISO) or ISO, any electric reliability authority, including NERC and SERC, and the KPSC.

1.1.16 Guarantee: As defined in the Recitals.

1.1.17 Guarantor: As defined in the Recitals.

1.1.18 Harmonic Distortion: As defined in Section 5.1.

1.1.19 Hawesville Smelter: The aluminum reduction plant owned and operated by Century and located in Hawesville, Kentucky, including any expansions, additions, improvements and replacements thereof or thereto at the existing site.

1.1.20 ICDR: As defined in Section 6.4.2.

1.1.21 Indemnified Liability: As defined in Section 3.1.

1.1.22 Indemnified Person: As defined in Section 3.1.

1.1.23 ISO: An Independent System Operator, as defined and approved by FERC.

1.1.24 Kenergy: As defined in the preamble to this Agreement.

1.1.25 KPSC: Kentucky Public Service Commission.

1.1.26 MISO: The Midcontinent Independent Transmission System Operator, Inc.

1.1.27 NERC: North American Electric Reliability Corporation.

1.1.28 Party or Parties: As defined in the preamble to this Agreement.

1.1.29 Person: Any individual, corporation, cooperative, partnership, joint venture, association, joint-stock company, limited partnership, limited liability company, limited liability partnership, trust, unincorporated organization or Governmental Authority.

1.1.30 Phase Imbalance: As defined in Section 5.1.

1.1.31 Prime Rate: The then-effective prime commercial lending rate per annum published in the "Money Rates" section of *The Wall Street Journal*. If *The Wall Street Journal* discontinues publication of the prime commercial lending rate, the Parties shall agree on a mutually acceptable alternative source for that rate.

1.1.32 Protective Relays: As defined in the Recitals.

1.1.33 RTO: A regional transmission organization as defined and approved by FERC.

1.1.34 RUS: United States Department of Agriculture Rural Utilities Service.

1.1.35 SERC: SERC Reliability Corporation.

1.1.36 Specifications: As defined in Section 2.4.

1.1.37 System Disturbance: As defined in Section 5.1.

1.1.38 Transaction: As defined in the Recitals.

1.1.39 Wholesale Transmission System: As defined in Section 5.1.

1.1.40 Work: As defined in Section 2.1.

1.2 Rules of Interpretation. Unless otherwise required by the context in which any term appears: (a) capitalized terms used in this Agreement will have the meanings specified in this Article 1 unless the context requires otherwise; (b) the singular will include the plural and vice versa; (c) references to "Articles," "Recitals," "Sections" or "Exhibits" are to the articles, recitals, sections or exhibits of this Agreement, unless otherwise specified; (d) all references to a particular Person in any capacity will be deemed to refer also to such Person's authorized agents, permitted successors and assigns in such capacity; (e) the words "herein," "hereof" and "hereunder" will refer to this Agreement as a whole and not to any particular section or subsection hereof; (f) the words "include," "includes" and "including" will be deemed to be followed by the phrase "without limitation" and will not be construed to mean that the examples given are an exclusive list of the topics covered; (g) references to this Agreement will include a reference to all exhibits hereto; (h) references to any agreement, document or instrument will be construed at a particular time to refer to such agreement, document or instrument as the same may be amended, modified, supplemented or replaced as of such time; (i) the masculine will include the feminine and neuter and vice versa; (j) references to any tariff, rate, or order of any Governmental Authority will mean such tariff, rate or order, as the same may be amended,

modified, supplemented or restated and be in effect from time to time; (k) if any action or obligation is required to be taken or performed on any day that is not a Business Day, such action or obligation must be performed on the next succeeding Business Day; (l) references to an Applicable Law will mean a reference to such Applicable Law as the same may be amended, modified, supplemented or restated and be in effect from time to time; (m) all accounting terms not defined in this Agreement will be construed in accordance with Accounting Principles; (n) all references to a time of day shall be a reference to the prevailing time in Henderson, Kentucky; and (o) the word "or" shall not be exclusive. The Parties collectively have prepared this Agreement, and none of the provisions hereof will be construed against one Party on the ground that it is the author of this Agreement or any part hereof.

ARTICLE 2

PROTECTIVE RELAYS

2.1 General. Century shall perform, or cause to be performed, all work and services necessary or appropriate to engineer, design, develop, procure, install, own, operate and maintain the Protective Relays (the "Work") in accordance with this Agreement and subject to the rights and obligations of Big Rivers and Kenergy set forth herein.

2.2 Standard of Care. Century shall perform the Work or cause the Work to be performed (a) in a professional, prudent, good and workman-like manner, (b) in a manner that minimizes to the extent commercially reasonable the adverse impact on the transmission facilities of Big Rivers and (c) in accordance with the terms of this Agreement, all Applicable Laws, all applicable Approvals of Governmental Authorities, consents of third parties obtained by any Party necessary in connection herewith, Good Utility Practice, including all applicable (i) engineering, environmental, construction and safety codes and standards, (ii) the terms of the insurance policies of Century relating to the Protective Relays, and (iii) the standards, rules and regulations of any Governmental Authority. If Big Rivers or Kenergy must obtain any consent from a third party relating to the Work, Big Rivers or Kenergy, as applicable, promptly shall notify Century of the need for such consent. Century shall not be responsible for performing any Work in accordance with any such consent until such consent has been obtained and notice given to Century.

2.3 Schedule of Installation and Operation. Century shall use commercially reasonable efforts to cause the Protective Relays to be installed and operational on or prior to the effective date of Kenergy's obligation to provide electric services to Century pursuant to the Electric Service Agreement. Failure of the Protective Relays to be installed and operational on or prior to such date shall not (a) affect Century's obligations hereunder, (b) result in any liability of Kenergy or Big Rivers to Century or any other Person; or (c) delay the effective date of Kenergy's or Big Rivers' obligation to provide electric services to Century pursuant to the Electric Service and the Arrangement Agreement.

2.4 Specifications. Century shall prepare or cause to be prepared all engineering and design drawings and specifications relating to the design, installation and operation and maintenance of the Protective Relays, including drawings, specifications and other documents necessary to (a) illustrate the scale and relationship of the components of the Protective Relays; (b) fix and describe engineering, structural, mechanical and electric systems of the Protective

Relays; and (c) complete construction of the Protective Relays (collectively, the "Specifications"). Century shall submit the Specifications to Big Rivers in an electronic format designated by Big Rivers for its review and comment. Big Rivers shall use commercially reasonable efforts to review the Specifications expeditiously but in all cases within seven days of Big Rivers' receipt of the Specifications. Century shall accept and incorporate into the Specifications any comments of Big Rivers to the extent that such comments relate to compliance with the standards, rules and regulations of any other Governmental Authority with jurisdiction relating to the Work.

2.5 No Approval or Reliance. As between Big Rivers and Kenergy, on one hand and Century on the other, with respect to any potential liability of Big Rivers for the Work or for the operation of the Protective Relays, Big Rivers' review of and comments with respect to the Specifications shall not constitute: (a) approval of the proposed Work or design of the Protective Relays or an evaluation or determination that the Specifications meet, or the Work or the proposed Protective Relays will meet or comply with, Section 2.2 or are otherwise suitable for their intended purpose; or (b) a waiver of, or release of Century from, any liability for errors or omissions related to or arising out of the Specifications, the Work or the Protective Relays. Century shall retain all documentation applicable to the Protective Relays for a period of three years following the earlier of (i) cessation of operation of the Protective Relays or (ii) the termination of this Agreement. Century acknowledges and agrees that (A) Kenergy and Big Rivers are entering into this Agreement to accommodate Century's desire to perform the Work based on Century's assessment that the Protective Relays will serve Century's intended purpose, (B) neither Kenergy nor Big Rivers has undertaken or will undertake any evaluation or analysis as to whether the Protective Relays will have the results desired by Century, (C) neither Kenergy nor Big Rivers has any duty, fiduciary or otherwise, regarding the suitability of the Work or the Protective Relays for their intended purpose, including whether the Work or the Protective Relays will meet any applicable requirements of any Governmental Authority, and (D) it is not relying on Kenergy or Big Rivers for engineering, legal, regulatory, financial or other advice but instead is seeking and will rely on the advice of its own professionals and advisors for such matters.

2.6 Certification and Seal. All engineering work performed or caused to be performed by Century pursuant to Section 2.1 requiring certification shall be certified, and all Specifications requiring sealing shall be sealed, by professional engineers licensed and properly qualified to perform such engineering services in all appropriate jurisdictions.

2.7 Location and Access. The Protective Relays shall be located on the real property owned by Century and located behind Century's meter at the Hawesville Smelter. Neither Big Rivers nor Kenergy shall have any obligation to provide access to real estate or otherwise make available to Century any space for the Protective Relays or the Work.

2.8 Payments and Reimbursements. Century shall own the Protective Relays. Century shall directly pay for the Work and any other costs attributable to ownership of the Specifications, the Work and the Protective Relays. Century shall reimburse Big Rivers or Kenergy for all out-of-pocket costs and expenses incurred by Big Rivers or Kenergy, as applicable, relating to the Specifications, the Work and the Protective Relays within ten (10)

Business Days of Century's receipt from Big Rivers or Kenergy, as applicable, of an invoice setting forth such costs in reasonable detail.

2.9 Coordination with Third-Parties. The Parties shall cooperate in good faith to submit to MISO and SERC, if applicable, a mutually agreeable proposal that: (a) Century be permitted to install Protective Relays to receive electric service under the Electric Service Agreement at capacities in excess of the maximum demand to be permitted under the Electric Service Agreement, without considering the Protective Relays or any other requirement that MISO may impose as a condition to exceeding such maximum demand; (b) permit when required to maintain electric reliability, MISO, NERC, SERC or any other Governmental Authority with jurisdiction over electric reliability to direct activation of the Protective Relays to curtail Century's load at the Hawesville Smelter, down to the maximum demand to be permitted under the Electric Service Agreement, without considering the Protective Relays; (c) such direction shall be a specified, agreed communication to Big Rivers; and (d) Big Rivers shall promptly provide Century with notice of any such communication in procedures to be developed by the Parties. At Century's sole cost and expense, Big Rivers shall install and maintain communication equipment required by MISO or SERC to facilitate such communication. Except for the gross negligence or willful conduct by Big Rivers or Kenergy, Century acknowledges and agrees that neither Kenergy nor Big Rivers shall have any liability to any Person with respect to such communication equipment or Big Rivers' installation or operation thereof.

2.10 Approvals. Century shall obtain, or cause to be obtained, any and all Approvals necessary for the Work, including, if applicable, any and all Approvals required by SERC or NERC, on or prior to the time such Approvals are required by Applicable Law to be duly obtained, given, accomplished or renewed, and all such Approvals shall be maintained in full force and effect and any conditions therein shall have been satisfied or waived. Century's obligations under this Section 2.10 shall include continuous compliance with all electric reliability standards, rules and regulations of SERC, NERC and FERC relating to the Work, including the ownership or operation and maintenance of the Protective Relays, or the performance of Century's obligations hereunder. Big Rivers and Kenergy shall cooperate with Century and support any requests for Approvals of Governmental Authorities required hereunder as long as Big Rivers and Kenergy have no objections to or concerns about the course of action proposed by Century with respect to any such Approval. Century shall be solely responsible for the contents of any such requests. Such cooperation shall include Big Rivers or Kenergy using reasonable commercial efforts to promptly submit on Century's behalf, if necessary, any request for such Approvals following completion thereof.

2.11 Protection of Persons and Property. Century shall be responsible for the safety and protection of its employees and agents and third parties, as well as its and their respective property, in connection with the performance of the Work. Century shall cause its employees and agents to comply with all safety programs relating to the Work. Other than due to its own gross negligence or willful conduct, neither Big Rivers nor Kenergy shall be held liable for any injury or death of any such Persons or any damage to any such personal property that may occur in connection with the performance of the Work.

2.12 Contractors. Notwithstanding any agreement with any contractor or subcontractor, as between Century, on one hand, and Big Rivers or Kenergy, on the other hand,

Century is solely responsible for the Work and will not be excused from its obligations hereunder if any portion of the Work is defective, non-operational or not performed in accordance with the requirements of this Agreement. Century has complete and sole responsibility as a principal for its agents and all other Persons hired to perform or assist in performing the Work, including contractors.

2.13 No Agency. Nothing in this Agreement is intended by the Parties, and nothing in this Agreement shall be construed, to create an agency, partnership, joint venture or similar relationship between the Parties with respect to the Protective Relays or any Work.

2.14 Insurance. Century shall maintain (a) property insurance for the Protective Relays in an amount equal to the replacement cost thereof and (b) other insurance (including liability insurance) with respect to the Protective Relays and the Work in accordance with Good Utility Practice and Applicable Law. At the request of Big Rivers, Century shall provide information regarding the insurance program maintained by Century in connection with this Agreement, including certificates or other reasonable evidence of any required insurance coverage. The insurance coverage required to be maintained hereunder shall not limit, restrict or otherwise affect Century's liabilities in connection with this Agreement.

2.15 Guarantee. Century acknowledges and agrees that (a) the Guarantee has been entered into as a condition to the entry into this Agreement by Big Rivers and Kenergy, and (b) Century shall cause a Substitute Guarantee (as defined in the Guarantee) to be entered into in the circumstances required therefor under the Guarantee.

2.16 Cessation of Smelting Operations; Survival. The Parties acknowledge and agree that (a) Century may permanently cease smelting operations at the Hawesville Smelter, including ceasing operation of the Protective Relays, and (b) in such case, Century's obligations under Sections 2.3, 2.4, 2.6, and 2.14, the first sentence of each of Sections 2.7 and 2.8, and Article 5 shall terminate.

ARTICLE 3

INDEMNIFICATION

3.1 Claims. In addition to any and all rights of reimbursement, indemnification, subrogation or any other rights pursuant to this Agreement or under law or in equity, Century hereby agrees that it will pay, and will protect, indemnify, and hold harmless each of Big Rivers and Kenergy and each of its respective designees, agents and contractors, and all of their respective directors, officers and employees (each, an "Indemnified Person"), on an after-tax basis, from and against (and will reimburse each Indemnified Person as the same are incurred for) any and all losses, claims, damages, liabilities, costs or other expenses (including, to the extent permitted by Applicable Law, the reasonable fees, disbursements and other charges of counsel) to which such Indemnified Person may become subject, excluding such losses, claims, damages, liabilities, costs and other expenses due to Big Rivers or Kenergy's gross negligence or willful conduct, whether incurred directly or incurred based on claims of third Persons, arising out of or relating to the Specifications, the Work or the Protective Relays, whether arising before or after the date hereof, including any or all of the following (each, an "Indemnified Liability"):

3.1.1 The execution or delivery of this Agreement, or any agreement or instrument contemplated hereby, the performance by the parties hereto or thereto of their respective obligations hereunder or thereunder, including all obligations relating to the Specifications, the Work or the Protective Relays;

3.1.2 Any environmental liability related to or arising out of the Work or the Protective Relays;

3.1.3 Any liability relating to the Protective Relays or this Agreement resulting from (a) entry into this Agreement prior to the satisfaction or waiver of the conditions to the obligations of Kenergy to commence service under the Electric Service Agreement, or (b) failure to enter into the Electric Service Agreement or failure of such conditions to be satisfied or waived;

3.1.4 Damage to or destruction of any plant, machinery or equipment of any Person, including (a) relating to or arising out of the failure, inoperability, or unavailability for their intended purpose of, the Protective Relays, or (b) due to the inaccuracy, faultiness or inadequacy in any respect of the Specifications or the Work;

3.1.5 Fines, penalties or other consequences resulting from the failure of the Protective Relays to perform their intended purpose, including assessments of Governmental Authorities, including NERC or SERC, or the failure to obtain or maintain, or satisfy any obligations relating to, any required Approval;

3.1.6 Any liability relating to or arising out of the installation or maintenance of the communication equipment to be installed pursuant to Section 2.9;

3.1.7 The out-of-pocket costs to obtain any consent of a third party necessary for the performance of the Work or the obligations of the Parties hereunder; or

3.1.8 Any actual or prospective claim, litigation, investigation or proceeding relating to any of the foregoing Subsections 3.1.1 through 3.1.7, whether based on contract, tort or any other theory, whether brought by any third party or by Century or otherwise, and regardless of whether any Indemnified Person is a party thereto, such Subsections 3.1.1 through 3.1.7 including, to the extent permitted by Applicable Law, the fees of counsel selected by such Indemnified Person incurred in connection with any investigation, litigation or other proceeding or in connection with the recovery of costs under the provisions of this Section 3.1.

3.2 Primary Indemnity. Except to the extent there is insurance coverage available, no Indemnified Person shall be obligated to pursue first any recovery under any other indemnity or reimbursement obligation before seeking recovery under the indemnification and reimbursement obligations of Century under this Agreement.

3.3 Payments.

3.3.1 All sums paid and costs incurred by any Indemnified Person with respect to any matter indemnified hereunder shall bear interest at the Prime Rate. Each such Indemnified Person shall promptly notify Century in a timely manner of any such amounts

payable by Century hereunder; *provided*, that any failure to provide such notice shall not affect Century's obligations under this Article 3.

3.3.2 Any amounts payable by Century pursuant to this Article 3, shall be payable within the later to occur of (i) ten (10) Business Days after Century receives an invoice for such amounts from any applicable Indemnified Person, and (ii) five (5) Business Days prior to the date on which such Indemnified Person expects to pay such costs on account of which Century's indemnity hereunder is payable, and if not paid by such applicable date shall bear interest at the Prime Rate from and after such applicable date until paid in full.

3.3.3 If any portion of any amounts invoiced hereunder is disputed by Century, the disputed amount must be paid, under protest, when due. If the disputed amount of the payment is found to be incorrect, Kenergy or Big Rivers, as applicable, shall promptly cause to be refunded to Century the amount that was not then due and payable, together with interest at the Prime Rate commencing on the first day after the date of payment and accruing on each day thereafter until the date the refund is made.

3.4 Survival. The provisions of this Article 3 shall survive termination of this Agreement and shall be in addition to any other rights and remedies of any Indemnified Person.

3.5 Subrogation. Upon payment by Century pursuant to this Article 3 of any claim under Section 3.1 in respect of any Indemnified Liability, Century, without any further action, shall be subrogated to any and all claims that the applicable Indemnified Person may have relating thereto, and such Indemnified Person shall at the request and expense of Century cooperate with Century and give at the request and expense of Century such further assurances as are necessary or advisable to enable Century vigorously to pursue such claims.

ARTICLE 4

REPRESENTATIONS AND WARRANTIES

Each Party hereby represents and warrants to each other Party as of the date hereof as follows:

4.1 Organization, Power and Authority. Such Party (a) is duly incorporated or formed, as applicable, validly existing and in good standing under the laws of its jurisdiction of formation, and is authorized to do business in the Commonwealth of Kentucky; and (b) has the requisite power and authority to conduct its business as presently conducted, to own or hold under lease its properties, and to enter into and perform its obligations under this Agreement.

4.2 Due Authorization and Enforceability. This Agreement has been duly authorized, executed and delivered by such Party, and assuming the due authorization, execution and delivery of this Agreement by each other Party, constitutes a legal, valid and binding obligation of such Party, enforceable against it in accordance with the terms hereof, except as enforceability may be limited by bankruptcy, insolvency, reorganization, arrangement, moratorium or other laws relating to or affecting the rights of creditors generally and by general principles of equity.

4.3 No Violation. The execution and delivery of this Agreement by such Party and the compliance by it with the terms and provisions hereof do not and will not (a) contravene any

Applicable Law relating to such Party or its organizational documents or by-laws, or (b) contravene the provisions of, or constitute a default (or an event that, with notice or passage of time, or both would constitute a default) by it under, any indenture, mortgage or other material contract, agreement or instrument to which such Party is a party or by which it, or its property, is bound.

4.4 Approvals. Except as set forth on Exhibit B, no Approval, authorization, consent or other action by, and no notice to or filing or registration with, and no new license from, any Person (including without limitation, any Governmental Authority) or under any Applicable Law to which such Party is subject is required for the due execution, delivery or performance by it of this Agreement. There are no conditions to the effectiveness of this Agreement with respect to such Party that have not been satisfied or irrevocably waived.

4.5 Proceedings. There is no pending or, to such Party's knowledge, threatened litigation, action, suit, proceeding, arbitration, investigation or audit against it by any Person before any Governmental Authority that: (a) questions the validity of this Agreement or the ability of such Party to perform its obligations hereunder, (b) affects or relates to any Approval relating to the Work or the Protective Relays, or (c) if determined adversely to such Party, would materially adversely affect its ability to perform under this Agreement.

4.6 Independent Decision. Such Party has, independently and without reliance upon any other Party and based on such documents and information as it has deemed appropriate, made its own analysis and decision to enter into this Agreement.

ARTICLE 5

SYSTEM DISTURBANCES

5.1 General. Century shall not use the Protective Relays or perform the Work in such manner as to cause a "System Disturbance." A "System Disturbance" is a use of electric power and energy that directly or indirectly results in a risk of harm to any Person or material damage to or interference with the transmission system of a wholesale power supplier of Kenergy or the transmission system of Big Rivers (the "Wholesale Transmission System"), a system connected with the Wholesale Transmission System or facilities or other property in proximity to the Wholesale Transmission System, or the plant, facility, equipment or operations of any other Person served directly or indirectly from the Wholesale Transmission System. A System Disturbance includes, but is not limited to "Harmonic Distortion" and "Phase Imbalance." A "Harmonic Distortion" is a level of current harmonic total demand distortion measured at the Delivery Point that exceeds the limits on total demand distortion described in IEEE Standard 519, Section 10. A "Phase Imbalance" is a use of capacity and energy in such a manner that causes a current imbalance between phases greater than 5% at the Delivery Point.

5.2 Changes. Kenergy or Big Rivers may require and Century shall, at Century's expense, make such changes in the Protective Relays as may be reasonably necessary to eliminate System Disturbances. If Century's use of power and energy creates an imbalance between phases that causes a System Disturbance, and Century fails to make changes in the Protective Relays requested by Big Rivers or Kenergy to correct such condition, in addition to

any other available remedies, Big Rivers or Kenergy may, in its determination of billing demand, assume that the load on each phase is equal to the greatest load on any phase.

ARTICLE 6

MISCELLANEOUS

6.1 Entire Agreement. This Agreement constitutes the entire agreement of the Parties hereto with respect to the subject matter hereof and supersedes all prior agreements, whether oral or written. This Agreement may be amended only by a written document signed by each of the Parties hereto. Each Party acknowledges that it has not relied upon any representations, statements or warranties of the other Party in executing this Agreement except for those representations and warranties expressly set forth in this Agreement.

6.2 Waiver. The waiver by a Party of any breach of any term, covenant or condition contained herein will not be deemed a waiver of any other term, covenant or condition, nor will it be deemed a waiver of any subsequent breach of the same or any other term, covenant or condition contained herein.

6.3 Notices. A notice, consent, approval or other communication under this Agreement must, except as otherwise provided herein, be delivered in writing, addressed to the Person to whom it is to be delivered, and must be (a) personally delivered to that Person's address (which will include delivery by a nationally recognized overnight courier service), or (b) transmitted by facsimile to that Person's address, with a duplicate notice sent by a nationally recognized overnight courier service to that Person's address. A notice given to a Person in accordance with this Section 6.3 will be deemed to have been delivered (i) if personally delivered to a Person's address, on the day of delivery if such day is a Business Day, or otherwise on the next Business Day, or (ii) if transmitted by facsimile to a Person's facsimile number and a correct and complete transmission report is received, or receipt is confirmed by telephone, on the day of transmission if such day is a Business Day, or otherwise on the next Business Day; *provided, however*, that such facsimile transmission will be followed on the same day with the sending to such Person of a duplicate notice by a nationally recognized overnight courier to that Person's address. For the purpose of this Section 6.3, the address of a Party is the address set out below or such other address that that Party may from time to time deliver by notice to the other Party in accordance with this Section 6.3:

If to Big Rivers:
Big Rivers Electric Corporation
201 Third Street
Henderson, Kentucky 42420
Attn: President and CEO
Fax: (270) 827-2558

If to Kenergy:
Kenergy Corp.
6402 Old Corydon Road
Henderson, Kentucky 42420
Attn: President and CEO
Fax: (270) 826-3999

If to Century: Century Aluminum Company
P.O. Box 500
State Route 271 North
Hawesville, Kentucky 42348
Attn: Plant Manager
Fax: (270) 852-2882

With copy to: Century Aluminum Company
One South Wacker Drive
Suite 1000
Chicago, Illinois 60606
Attn: General Counsel
Fax: (312) 696-3102

6.4 Dispute Resolution.

6.4.1 If a Dispute arises, a Party may request a meeting among authorized representatives of the Parties to discuss and attempt to reach a resolution of the Dispute. Such meeting will take place within ten (10) Business Days or such shorter or longer time as agreed upon by the Parties.

6.4.2 Absent resolution of the Dispute pursuant to Section 6.4.1, and subject to a minimum amount in controversy of $100,00.00, the Parties shall submit the matter to be settled, subject to Section 6.4.9, by binding arbitration by a tribunal of three (3) arbitrators constituted and acting under the International Arbitration Rules then in effect of the International Centre for Dispute Resolution ("ICDR") of the American Arbitration Association (the "AAA Rules"), in accordance with the following terms and conditions:

(a) In the event of any conflict between the AAA Rules and the provisions of this Agreement, the provisions of this Agreement shall apply.

(b) The ICDR shall administer the arbitration.

(c) The seat of arbitration shall be Henderson, Kentucky, unless otherwise agreed by the Parties, and the fact that hearings are held elsewhere shall not affect the seat of arbitration.

6.4.3 Subject to Sections 6.4.1 and 6.4.2, any Party may pursue any remedy available at law or equity with respect to any dispute or breach under this Agreement. Nothing in this Agreement shall expand or reduce the jurisdiction of any Governmental Authority.

6.4.4 The following procedures shall govern the selection of arbitrators:

(a) The claimant Party or Parties shall appoint one arbitrator in accordance with the AAA Rules, the respondent Party or Parties shall appoint one arbitrator in accordance with the AAA Rules within thirty (30) days after the appointment of the first arbitrator, and the two arbitrators so appointed shall appoint the third (and presiding) arbitrator in

accordance with the AAA Rules within thirty (30) days after the appointment of the second arbitrator.

(b) In the event of an inability by the two Party-nominated arbitrators to agree on an arbitrator in accordance with Section 6.4.4(a), the appointing authority for the third arbitrator shall be the ICDR, acting in accordance with such rules as it may adopt for such purpose. The ICDR shall use its best efforts to appoint such third arbitrator within thirty (30) days of an application being made for such purpose.

(c) Notwithstanding Sections 6.4.4(a) and 6.4.4(b), each arbitrator selected pursuant to this Section 6.4.4 shall (i) have substantial experience in the electric utility sector, and (ii) not have been employed or been a consultant to any Party in the past.

6.4.5 The arbitration tribunal shall have the power to grant any remedy or relief that it deems just and equitable and that is in accordance with the terms of this Agreement, and including specific performance and injunctive relief, whether interim or final. Any such relief and any interim, provisional or conservatory measure ordered by the arbitral tribunal may be specifically enforced by any court of competent jurisdiction.

6.4.6 The losing Party shall pay the fees and costs of the prevailing Party.

6.4.7 The award of the arbitral tribunal shall be subject to appeal or requests for rehearing pursuant to Section 6.7.

6.4.8 The award of the tribunal may be enforced by any court of competent jurisdiction and may be executed against the person and assets of the losing Party in any competent jurisdiction. For the avoidance of doubt, the Parties acknowledge and agree that a court of any jurisdiction where the assets of a Party against which enforcement is sought may be found, or a court that has subject matter jurisdiction over any proceeding to confirm or enhance the award, is a court of competent jurisdiction and venue, and the Parties irrevocably consent to the exercise of personal jurisdiction in any such court, and irrevocably waive any claim that any such jurisdiction is an inconvenient forum.

6.4.9 Except for arbitration proceedings pursuant to this Section 6.4, no action, lawsuit or other proceeding (other than proceedings for the confirmation or enforcement of an arbitration award, an action to compel arbitration or an application for interim, provisional or conservatory measures in connection with the arbitration, or to obtain documentary or testimonial evidence) shall be brought by or between the Parties in connection with any Dispute; *provided*, that, where delay in doing so could result in irreparable harm, each Party to the arbitration proceeding retains the right to seek interim, provisional or conservatory measures in accordance with Section 6.7, and any such request shall not be deemed incompatible with this Agreement to arbitrate or constitute a waiver of the right to arbitrate.

6.5 Successors and Assigns.

6.5.1 This Agreement will inure to the benefit of and be binding upon the Parties hereto and their respective successors and permitted assigns. No interest in this Agreement may be transferred or assigned by either Party, in whole or in part, by instrument or

operation of law, without the prior written consent of the other Parties, except as provided in Section 6.5.4, and except that, subject to satisfaction of the conditions of Section 6.5.2, assignment may be made by a Party to such Person as acquires all or substantially all the assets of the assigning Party or that merges with or acquires all or substantially all of the equity of such Party. When consent is required, consent may not be unreasonably withheld, conditioned or delayed.

6.5.2 In no event may a Party assign this Agreement (including as part of a sale of all or substantially all the assets of the assigning Party or a merger with or purchase of substantially all the equity interests of such Party) (i) to any Person that does not have adequate financial capacity as demonstrated to the reasonable satisfaction of the non-assigning Parties or that would otherwise be unable to perform the obligations of the assigning Party pursuant to this Agreement, (ii) to any Person that does not agree to assume all rights and obligations of the assigning Party under this Agreement, or (iii) on any terms at variance from those set forth in this Agreement except as agreed to in writing by the Parties.

6.5.3 No permitted assignment or transfer will change the duties of the Parties, or impair the performance under this Agreement except to the extent set forth in such permitted assignment and approved in writing by the Parties. No Party is released from its obligations under this Agreement pursuant to any assignment, unless such release is granted in writing.

6.5.4 A Party may, without the approval of any other Party, assign this Agreement as collateral security or grant one or more mortgages (including one or more deeds of trust or indentures) on or security interests in its interest under this Agreement in connection with the general financing of its assets or operations.

6.6 Governing Law. This Agreement shall be interpreted, governed by and construed under the laws of the Commonwealth of Kentucky, without regard to its conflicts of law rules.

6.7 Jurisdiction. Subject to Section 6.4, the Parties hereby agree that the courts of the Commonwealth of Kentucky will have exclusive jurisdiction over any and all Disputes, *provided* that the subject matter of such Dispute is not a matter reserved to the U.S. federal judicial system (in which event exclusive jurisdiction and venue will lie with the U.S. District Court for the Western District of Kentucky), and the Parties hereby agree to submit to the jurisdiction of Kentucky courts for such purpose. Venue in state court actions will be in the Henderson Circuit Court as the court in which venue will lie for the resolution of any related Disputes under this Agreement. Each Party hereby irrevocably waives, to the fullest extent permitted by Applicable Law, any objection that it may now or hereafter have to the laying of venue of any action, suit or proceeding as provided in this Section 6.7 and any claim that such action, suit or proceeding brought in accordance with this Section 6.7 has been brought in an inconvenient forum. Nothing in Section 6.4 or this Section 6.7 prohibits a Party from referring to FERC or any other Governmental Authority any matter properly within its jurisdiction. Nothing in this Agreement shall limit or expand the jurisdiction of any Governmental Authority over Kenergy or Big Rivers. In any proceeding hereunder, each Party irrevocably waives, to the fullest extent allowed by law, its right, if any, to trial by jury. For the avoidance of doubt, each Party hereby agrees to accept service of any papers or process in any arbitration under Section 6.4, or any action or

proceeding arising under or relating to such arbitration, at the address set forth in Section 6.3, and agrees that such service shall be, for all purposes, good and sufficient.

6.8 Good Faith Efforts. The Parties agree that each will in good faith take all reasonable actions within their reasonable control as are necessary to permit each other Party to fulfill its obligations under this Agreement; *provided* that no Party will be obligated to expend money or incur material economic loss in order to facilitate performance by any other Party. Where the consent, agreement, or approval of any Party must be obtained hereunder, such consent, agreement or approval may not be unreasonably withheld, conditioned, or delayed unless otherwise provided herein. Where any Party is required or permitted to act or fail to act based upon its opinion or judgment, such opinion or judgment may not be unreasonably exercised. Where notice to any Party is required to be given herein, and no notice period is specified, reasonable notice shall be given.

6.9 Headings. The headings contained in this Agreement are solely for convenience and do not constitute a part of the agreement between the Parties, nor should such headings be used to aid in any manner in the construction of this Agreement.

6.10 Third-Party Beneficiaries. Nothing in this Agreement may be construed to create any duty to, or standard of care with reference to, or any liability to, or any benefit for, any Person not a Party to this Agreement.

6.11 No Power Sales Commitment. Nothing contained in this Agreement shall be deemed to be or create an agreement or commitment of Big Rivers or Kenergy to sell to Century, or an agreement of Century to purchase from Big Rivers or Kenergy, any electric energy or ancillary or related services, including reactive power.

6.12 Severability. Any term or provision of this Agreement that is invalid or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such invalidity or unenforceability without rendering invalid or unenforceable the remaining terms and provisions of this Agreement or affecting the validity or enforceability of any of the terms or provisions of this Agreement in any other jurisdiction.

[Signatures Follow on Next Page]

IN WITNESS WHEREOF, this Agreement is hereby executed as of the day and year first above written.

BIG RIVERS ELECTRIC CORPORATION

By: Mark A. Bailey
Name: Mark A. Bailey
Title: President and CEO

KENERGY CORP.

By: _____
Name:
Title:

CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

By: _____
Name:
Title:

IN WITNESS WHEREOF, this Agreement is hereby executed as of the day and year first above written.

BIG RIVERS ELECTRIC CORPORATION

By: _____
Name: Mark A. Bailey
Title: President and Chief Executive Officer

KENERGY CORP.

By: _____
Name: Gregory J. Starheim
Title: President and Chief Executive Officer

CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

By: _____
Name:
Title:

IN WITNESS WHEREOF, this Agreement is hereby executed as of the day and year first above written.

BIG RIVERS ELECTRIC CORPORATION

By: _____
Name: Mark A. Bailey
Title: President and Chief Executive Officer

KENERGY CORP.

By: _____
Name: Gregory J. Starheim
Title: President and Chief Executive Officer

CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

By: _____
Name: Sean M. Byrnes
Title: Plant Manager Hawesville

EXHIBIT A

PROTECTIVE RELAYS

The Protective Relay System will be designed to allow reductions in load at the Hawesville Smelter consistent with a MISO Operating Guide that is expected in July 2013. It may require manual or automatically implemented system or a combination of both.

EXHIBIT B

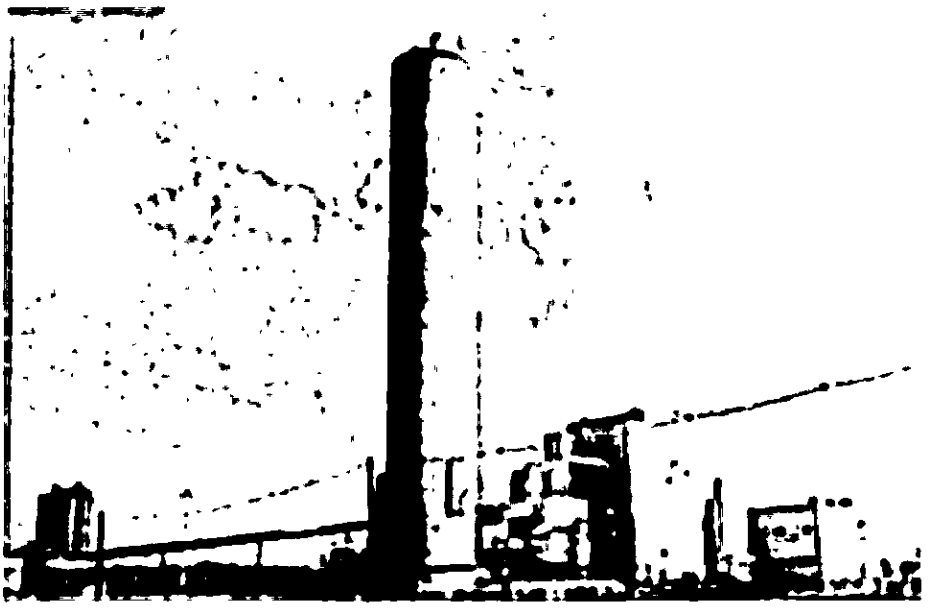
REQUIRED CONSENTS

SERC approval is required only for a special protective system that affects the bulk electric system. No approval is required by MISO, but MISO will review this Agreement as part of its verification or confirmation of the Curtailable Load to be permitted under the Electric Service Agreement and Attachment Y to MISO's Open Access Transmission Tariff.

EXHIBIT A-3

Big Rivers
ELECTRIC CORPORATION

Big Rivers Electrical Corporation
Environmental Compliance Study



Prepared by: Sargent & Lundy, LLC
Revision: Final
Date: February 13th, 2012

Sargent & Lundy

55 East Monroe Street • Chicago, IL 60603 USA • 312-269-2000

Big Rivers

Green, Henderson, Reid, Coleman & Wilson Stations

Environmental Compliance Study

Prepared for
Big Rivers Electric Corporation

SL-010881
February 2012
Project 12845-001
55 East Monroe Street

Sargent & Lundy LLC

Chicago, IL 60603-5780 USA

LEGAL NOTICE

This report ("Deliverable") was prepared by Sargent & Lundy, L.L.C. ("S&L"), expressly for the sole use of Big Rivers Electric Corporation ("Client") in accordance with the agreement between S&L and Client. This Deliverable was prepared using the degree of skill and care ordinarily exercised by engineers practicing under similar circumstances. Client acknowledges: (1) S&L prepared this Deliverable subject to the particular scope limitations, budgetary and time constraints, and business objectives of the Client; (2) information and data provided by others may not have been independently verified by S&L; and (3) the information and data contained in this Deliverable are time sensitive and changes in the data, applicable codes, standards, and acceptable engineering practices may invalidate the findings of this Deliverable. Any use or reliance upon this Deliverable by third parties shall be at their sole risk.

CONTRIBUTORS

PREPARED BY:

Caleb L. Kadera
Project Engineer

Kenneth J. Snell
Regulatory Analyst

Paul S. Farber
Environmental Lead

REVIEWED BY:

Adam C. Landry
Project Manager

APPROVED BY:

Todd M. Hanssen
Project Director

William DePriest
Director

2/14/12
Date

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GLOSSARY OF TERMS

ACI - Activated Carbon Injection: A mercury reduction process system that involves the injection of a very fine dry powdered form of carbon into the flue gas stream of coal burning power plants.

AFUDC – Allowance for Funds Used During Construction: Interest that occurs on capital project loans during the construction period.

BACT – Best Available Control Technology: BACT is a pollution control standard detailed in the Clean Air Act in which the Environmental Protection Agency (EPA) determines what air pollution control technology should be applied to control a specific pollutant to a specified limit.

BREC – Big Rivers Electric Corporation

BTA – Best technology available

CAIR – Clean Air Interstate Rule: A rule issued by the EPA in 2005 that was intended to implement the Clean Air Act requirements concerning the transport of air pollutants across state boundaries, and assist downwind states to attain and maintain the National Ambient Air Quality Standards for ozone and fine particulate matter. The rule was vacated by the U.S. Court of Appeals in 2008. See CATR – Clean Air Transport Rule.

CCR - Coal Combustion Residuals: Byproducts of the coal combustion process, including but not limited to fly ash, bottom ash, and wet flue gas desulfurization waste streams.

Cl – Chloride: Constituent of Coal.

CO - Carbon Monoxide: A flue gas pollutant.

CPM – Condensable Particulate Matter: See PM.

CSAPR – Cross-State Air Pollution Rule: Rule issued by the EPA that replaces the previously issued 2005 Clean Air Interstate Rule.

DSI - Dry Sorbent Injection: A process system that involves the injection of a dry sorbent into the flue gas stream of coal burning power plants. May be used for reduction of sulfur trioxide (SO_3) or other acid gases.

EGU MACT - Electric Generating Utility Maximum Achievable Control Technology: Proposed rule issued in March 2011 by the EPA setting emissions standards for certain pollutants, including mercury, particulate matter, acid gases, and several others. MACT standards for air pollution require a maximum reduction of hazardous emissions, considering cost and feasibility, and are set based on a review of existing sources.

EPA – United States Environmental Protection Agency

GLOSSARY OF TERMS (cont.)

ESP - Electrostatic Precipitator: A particulate matter control device installed in boiler flue gas systems.

FGD – Flue gas desulfurization

FPM – Filterable Particulate Matter: See PM.

fps – Feet per Second: Unit of measure.

HAP – Hazardous Air Pollutants: Hazardous emissions from power plants or other sources.

HCl – Hydrochloric Acid: An acid byproduct of coal combustion.

Hg – Mercury: Constituent of certain coals.

ICR - Information Collection Request: A request by the EPA for operating data from electric generating unit operators. Used to support the development of emission limits.

IM&E - Impingement Mortality and Entrainment: Injury, death, or entrainment of fish and other organisms. See 316 (b).

KPDES - Kentucky Pollutant Discharge Elimination System

lb/MMBtu - Pounds per Million British Thermal Units: A unit of measure.

lb/TBtu – Pounds per Trillion British Thermal Units: A unit of measure.

LNB – Low-NO_X burner

LNCFS - Low NO_X Concentric Firing System: A proprietary combustion system arrangement for Alstom (formerly Combustion Engineering) cyclone boilers. The equipment may include low NO_X burners, separated overfire air systems (see OFA definition, as well as other technologies depending on the generation of LNCFS system being considered. Currently there are four generations of this system that have been developed (LNCFS I, II, III, and IV).

MACT – Maximum Achievable Control Technology

MGD – Million gallons per day

MMBtu – Million British Thermal Units: A unit of measure.

NAAQS – National Ambient Air Quality Standards: Standard developed by the EPA to set the required levels of air quality.

GLOSSARY OF TERMS (cont.)

NO_X – Nitrogen Oxides

NPV – Net Present Value: A present value is the value now of a stream of future cash flows, negative or positive, including initial costs of purchasing an asset.

O&M - Operating and Maintenance

OFA – Overfire Air: Also SOFA or Separated Overfire Air System. Various methods of staging combustion in a boiler for enhanced NO_X reductions.

ORSANCO – Ohio River Sanitation Commission: Discharges to the Ohio River are also regulated by ORSANCO. It sets Pollution Control Standards for industrial & municipal waste water discharges to the Ohio River.

pH: A measure of the acidity or basicity of an aqueous solution.

PM – Particulate Matter: Condensable or filterable particulate matter in flue gas stream. PM2.5 refers to fine particulate matter with diameters less than 2.5 micrometers; PM10 to matter with diameters less than 10 micrometers.

RCRA – Resource Conservation and Recovery Act: The RCRA Act gives the EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. Sets the framework for management of non-hazardous wastes.

ROFA – Rotating overfire air

S&L – Sargent & Lundy, LLC

SCR - Selective Catalytic Reduction: A NO_X reduction system that uses a reagent such as ammonia in conjunction with a catalyst reactor to convert NO_X into harmless nitrogen.

Sebree Generating Station: Encompasses the Robert D. Green Station, Robert A. Reid Station, and the HMP&L Station.

SNCR - Selective Non-Catalytic Reduction: A NO_X reduction process technology that involves the injection of a NO_X reduction agent such as ammonia or urea solution into a boiler.

SO_2 – Sulfur Dioxide

SO_3 – Sulfur Trioxide

SSC – Submerged Scraper Conveyor: A dry bottom ash handling technology.

GLOSSARY OF TERMS (cont.)

TBtu – Trillion British Thermal Units: A unit of measure.

Title V: Operating permits for air pollution sources are issued under Title V of the EPA's Clean Air Act

TPM – Total Particulate Matter

tpy – Tons per year

WFGD - Wet Flue Gas Desulfurization: A wet scrubbing process for removing SO_2 from flue gas streams that uses an alkaline reagent introduced as a fine spray in an absorber vessel.

316(b) Regulations: Environmental regulations being developed by the EPA that require the cooling water intake structures to reflect the best technology available for minimizing adverse environmental impact. Adverse environmental impacts include the impinging of fish and other organisms on cooling system intake screens or pumping equipment, as well as the entrainment of fish and other organisms in the cooling systems. See Impingement Mortality and Entrainment (IM&E).

EXECUTIVE SUMMARY

Environmental regulations currently in place and being actively developed by the U.S. Environmental Protection Agency (EPA) and the U.S. Congress are expected to require additional reductions of several air pollutants for many electric utilities. These include sulfur dioxide (SO_2) and nitrogen oxides (NO_X), which are addressed under the Cross-State Air Pollution Rule (CSAPR) regulations, and total particulate matter (TPM), mercury (Hg), and hydrochloric acid (HCl), which are addressed under the EPA's proposed Electric Generating Utility Maximum Achievable Control Technology (EGU MACT) regulations. Additional EPA regulations are proposed to reduce impingement mortality and entrainment of fish, eggs, larvae, and other aquatic organisms that come in contact with a station's cooling water intake system. (Since this study was completed, the EGU MACT was replaced the Mercury and Air Toxins Standard (MATS). This report has not been updated to reflect the new MATS rule.)

The EPA is also proposing alternative approaches for regulating coal combustion residual (CCR) waste products. It is likely that CCR regulatory requirements for pond modification and operation, along with the pending wastewater discharge effluent guideline requirements, will make continued operation of the dewatering ponds impractical. Wastewater discharge effluent guidelines being proposed by the EPA will likely also impact the station's ability to discharge large volumes of ash sluice water to the environment, due to limits on total dissolved solids, metals, pH and other parameters, further necessitating the dry bottom ash conversions.

Phase I of this study provides a thorough assessment of the various expected future regulations as they apply to BREC. Phase II of this study draws on the conclusions developed in the Phase I regulatory assessment, and provides an evaluation of possible compliance strategies, using existing technologies, new technologies, or a combination of technologies. Phase III screens the viable technology selections based on an evaluation using order of magnitude capital and O&M costs. Where the screening results in multiple compliance strategies being proposed, a net present value (NPV) analysis is used to provide the optimal selection. The impact of any changes between the proposed or predicted rules considered in this study and the final rules that are promulgated should be evaluated and the conclusions adjusted accordingly.

The results are summarized along with the associated net present value (NPV). Currently planned O&M improvements are not considered in the costs described in this evaluation since S&L understands them to be already accounted for in the operating budget for current or upcoming fiscal years.

SULFUR DIOXIDE (SO_2)

In order to achieve compliance with their 2012 and 2014 CSAPR allocations, BREC will need to reduce their current SO_2 fleet-wide emissions from 27,286 tpy to 26,478 tpy in 2012–2013 and to 13,643 tpy for 2014 and beyond. Although potential reductions are speculative at this time, additional allocation reductions of 20% may follow the CSAPR regulations as part of National Ambient Air Quality Standards (NAAQS), which will require an even greater reduction in emission to meet the potential 10,914-tpy allocation in 2016–2018. To meet the forthcoming CSAPR emission allocations and the potential NAAQS reductions, BREC will need to make modifications to reduce emissions. A summary of the baseline emissions data, recommended modifications for CSAPR and NAAQS compliance, expected emission reductions, and the estimated NPV associated with the technology selections is provided below.

Table ES-1 — SO_2 CSAPR and NAAQS Compliance Strategy

Unit	Baseline SO_2 Emissions (tpy)	Current Annual SO_2 Emission Rate (lb/MMBtu)	Technology Selection	Estimated New SO_2 Emissions (tpy)	Estimated New Annual SO_2 Emission Rate (lb/MMBtu)	Net Present Value at Baseline Credit Value (2011$ Million)
Coleman Unit C01	1,473	0.250	None**	1,473	0.250	N/A
Coleman Unit C02	1,473	0.250	None**	1,473	0 250	N/A
Coleman Unit C03	1,571	0.250	None**	1,571	0 250	N/A
Wilson Unit W01	9,438	0 510	New Tower Scrubber - 99% removal	1,049	0 057	$82.5
Green Unit G01	1,873	0.186	None	1,873	0.186	N/A
Green Unit G02	1,414	0 139	None	1,414	0.139	N/A
HMP&L Unit H01	2,227	0.347	Run both pumps & spray levels, install 3rd pump as	788	0 123	-$2 1
HMP&L Unit H02	2,745	0 415	Run both pumps & spray levels, install 3rd pump as	835	0 126	-$2 1
Reid Unit R01	5,066	4 522	Natural Gas with Existing Burners	1	0 001	$8 9
Reid Unit RT	5	0.117	None	5	0.117	N/A
Fleet Total	**27,286**	**0.384**	**N/A**	**10,482**	**0.148**	**$87.3**

**Note SO2 emissions in this scenario have been adjusted to reflect data received from BREC confirming that the Coleman FGD is capable of producing emission rates of 0.25lb/MMBtu and reaching removal rates of approximately 95%.

UNIT 1 NITROGEN OXIDES

To achieve compliance with their 2012 and 2014 CSAPR NO_X allocations, BREC will need to reduce their current fleet-wide emissions from 12,074 tpy to 11,186 tpy in 2012–2013 and to 10,142 tpy for 2014 and beyond. Potential additional allocation reductions of 20% may follow the CSAPR regulations as part of NAAQS which will require an even greater reduction in emission to meet the potential 8,114 tpy allocation in 2016–

2018. To meet the forthcoming CSAPR emission allocations and the potential NAAQS reductions, BREC will need to make a number of modifications to reduce NO_X emissions. A summary of the baseline emissions data, recommended modifications for CSAPR and NAAQS compliance, expected emission reductions, and the estimated NPV associated with the technology selections is provided below.

Table ES-2 — NO_X CSAPR Compliance Strategy (2014)

Unit	Baseline NO_X Emissions (tpy)	Current Annual NO_X Emission Rate (lb/MMBtu)	Technology Selection	Estimated New NO_X Emissions (tpy)	Estimated New Annual NO_X Emission Rate (lb/MMBtu)	Net Present Value at Baseline Credit Value (2011$ Million)
Coleman Unit C01	1,858	0 330	Advanced Burners	1,672	0.297	$0 32
Coleman Unit C02	1,585	0.332	Advanced Burners	1,427	0.299	$0.32
Coleman Unit C03	2,044	0 335	Advanced Burners	1,840	0 302	$0.32
Wilson Unit W01	934	0 052	None	934	0 052	N/A
Green Unit G01	2,050	0.206	None	2,050	0.206	N/A
Green Unit G02	2,168	0.215	SCR @ 85% Removal	325	0 032	$43 90
HMP&L Unit H01	460	0.071	None	460	0 071	N/A
HMP&L Unit H02	418	0 069	None	418	0 069	N/A
Reid Unit R01	512	0 522	Natural Gas with Existing Burners	292	0.298	See SO_2
Reid Unit RT	45	0.708	None	45	0.708	N/A
Fleet Total	**12,074**	**0.177**	**N/A**	**9,462**	**0.139**	**$44.9**

Table ES-3 — NO_X NAAQS Compliance Strategy (2016–2018)

Unit	Baseline NO_X Emissions (tpy)	Current Annual NO_X Emission Rate (lb/MMBtu)	Technology Selection	Estimated New NO_X Emissions (tpy)	Estimated New Annual NO_X Emission Rate (lb/MMBtu)	Net Present Value at Baseline Credit Value (2011$ Million)
Coleman Unit C01	1,858	0 330	Advanced Burners	1,672	0.297	$0.32
Coleman Unit C02	1,585	0.332	Advanced Burners	1,427	0.299	$0 32
Coleman Unit C03	2,044	0 335	Advanced Burners	1,840	0.302	$0 32
Wilson Unit W01	934	0 052	None	934	0 052	N/A
Green Unit G01	2,050	0.206	SCR @ 85% Removal	307	0 031	$46.50
Green Unit G02	2,168	0.215	SCR @ 85% Removal	325	0.032	$43 90
HMP&L Unit H01	460	0.071	None	460	0.071	N/A
HMP&L Unit H02	418	0 069	None	418	0 069	N/A
Reid Unit R01	512	0.522	Natural Gas with Existing Burners	292	0.298	See SO_2
Reid Unit RT	45	0 708	None	45	0.708	N/A
Fleet Total	**12,074**	**0.177**	**N/A**	**7,720**	**0.113**	**$91.4**

IMPLEMENTATION TIMELINE FOR CSAPR AND MACT COMPLIANCE (SO_2 AND NO_X)

Since BREC has a total of nine plants where potential modifications can affect overall fleet-wide compliance with CSAPR and potential NAAQS regulations, a running summation of emissions above and (below) their allocations was plotted along with the startup dates of the recommended modifications. Implementing the strategies below will allow BREC to achieve fleet-wide compliance with minimal credit purchases while major modifications are completed.

Figure ES-1 — Cumulative Emissions Above or Below CSAPR SO_2 and NO_X Allocations

(Adjusted Outage Schedule)

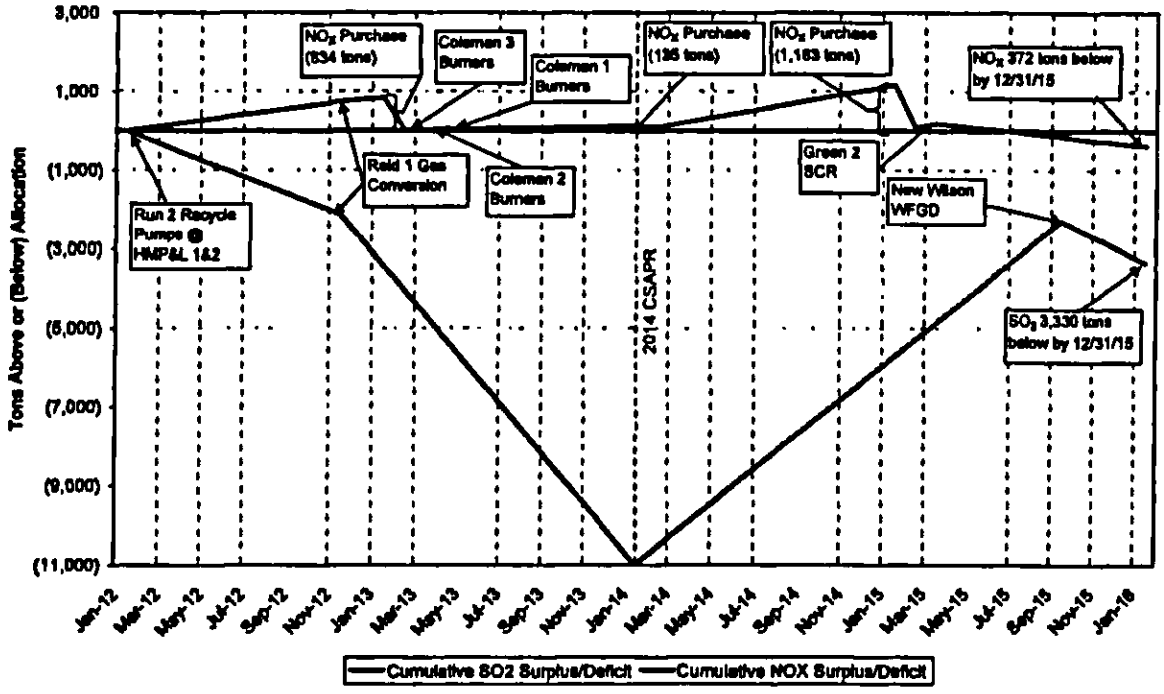
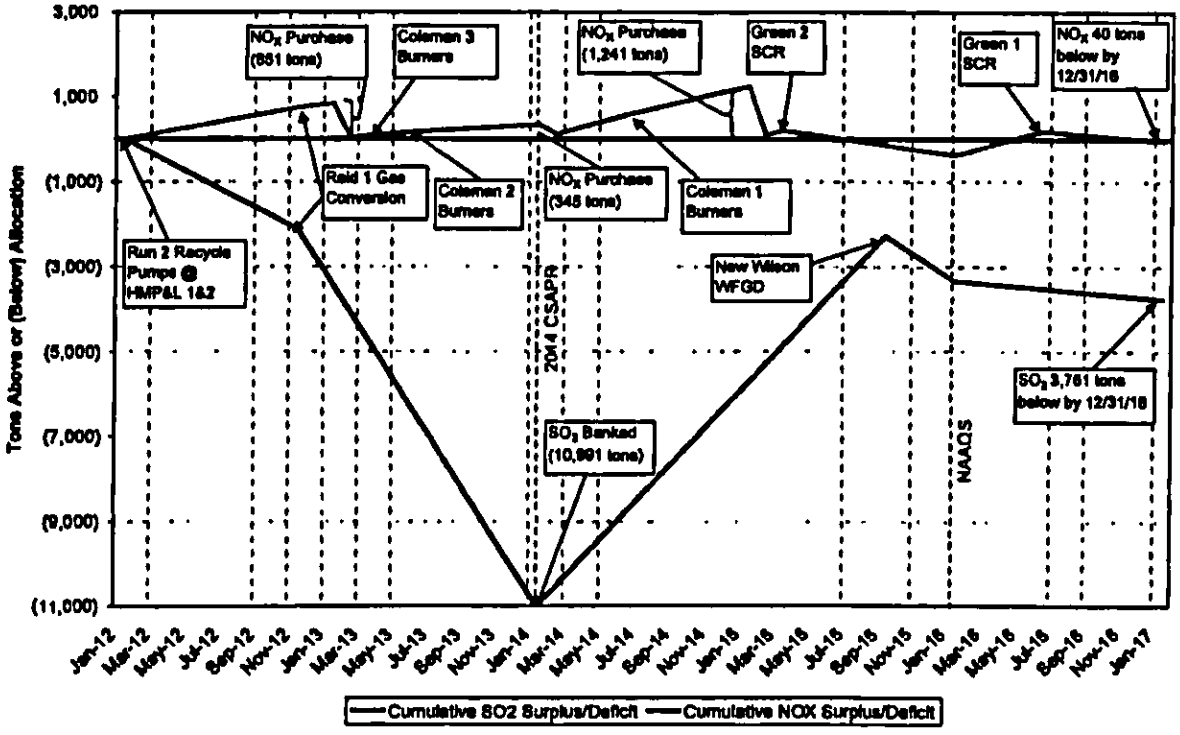


Figure ES-2 — Cumulative Emissions Above or Below CSAPR and NAAQS SO_2 and NO_X Allocations



MERCURY

Baseline mercury emissions at all BREC units except Henderson (HMP&L) are above the proposed MACT limit of 1.2 lb/TBtu and will need to be reduced to achieve compliance. It is anticipated that that activated carbon injection (ACI) systems will be required at each of the over-emitting units to lower emission rates to the required levels. A summary of each unit's baseline emissions, required reduction, recommended modification, and associated NPV are provided below.

Table ES-4 — MACT Hg Compliance Summary

Unit	Baseline Elemental Hg Emission Rate (lb/TBtu)	Baseline Oxidized Hg Emission Rate (lb/TBtu)	Baseline Total Hg Emission Rate (lb/TBtu)	Required Percent Reduction for MACT Compliance	Technology Selection	NPV (2011$ Million)
Coleman Unit C01	2.67	0.85	3.52	66%	Activated Carbon Injection	$11.9
Coleman Unit C02						$11.9
Coleman Unit C03						$11.9
Wilson Unit W01	1.56	0.21	1.77	32%	Activated Carbon Injection	$26.7
Green Unit G01	2.73	0.36	3.09	61%	Activated Carbon Injection	$15.3
Green Unit G02	2.46	0.12	2.58	53%	Activated Carbon Injection	$15.3
HMP&L Unit H01	0.34	0.28	0.62	N/A	None	N/A
HMP&L Unit H02	0.22	0.24	0.47	N/A	None	N/A
Reid Unit R01	N/A	N/A	6.5	82%	Natural Gas Conversion	N/A
TOTAL						$93.0

PARTICULATE MATTER

High condensable emission levels at Coleman and HMP&L a largely contributing to emission levels above the proposed limit of 0.030 lb/MMBtu. A reduction in condensable PM levels >50% can be achieved by adding a dry sorbent (hydrated lime) injection system, which would provide a large improvement in total PM emissions. To improve filterable removal efficiencies, it is suggested that BREC modify the existing electrostatic precipitators (ESPs) with advanced electrodes and high frequency transformer rectifier (TR) sets. The combination of these two modifications at HMP&L and Green should result in PM emissions below the MACT limit. Other BREC units that are considering ACI systems for mercury control and dry sorbent injection (DSI) systems for improved ACI efficiency and acid gas control should also consider upgrading the existing electrodes and installing high frequency TR sets to remain in compliance. However, testing on the affects of adding these systems should be conducted before implementing these strategies. Baseline TPM emissions, required

reductions compliance, recommended equipment upgrades/modifications, and associated NPV to meet the anticipated MACT limits are provided below.

Table ES-5 — MACT TPM Compliance Summary

Unit	Baseline Total PM Emission Rate (lb/MMBtu)	Required Percent Reduction for MACT Compliance	Technology Selection	NPV (2011$ Million)
Coleman Unit C01	0.0398	25%	Hydrated Lime DSI & ESP Upgrades	$10.3
Coleman Unit C02				$10.3
Coleman Unit C03				$10 3
Wilson Unit W01	0 0196	N/A	Low Oxidation Catalyst & ESP Upgrades	$11.2
Green Unit G01	0.0195	N/A	Hydrated Lime DSI & Potential ESP Upgrades	$11.2
Green Unit G02	0.0169	N/A	Hydrated Lime DSI & Potential ESP Upgrades	$11.2
HMP&L Unit H01	0.0319	6%	Hydrated Lime, Low Oxidation Catalyst & ESP Upgrades	$11.2
HMP&L Unit H02	0.0324	7%	Hydrated Lime, Low Oxidation Catalyst & ESP Upgrades	$11.2
Reid Unit R01	0.269[1]	~90%	Natural Gas Conversion	N/A
TOTAL				$86.9

(1) Condensable particulate emission data was not available for Reid. Value shown is filterable particulate matter only.

AIR QUALITY COMPLIANCE RECOMMENDATION SUMMARY (CSAPR 2014 & MACT)

The table below provides the complete BREC fleet-wide recommended compliance strategy to meet the 2014 CSAPR and potentially forthcoming MACT regulations. Technologies selected along with estimated project capital costs are shown.

Table ES-6 — Air Quality Compliance Strategy Summary

BREC Unit	Technology Selection: CSAPR - Selection: SO_2	CSAPR - Selection: NO_x	MACT - Selection: HCl	MACT - Selection: Hg	MACT - Selection: CPM	MACT - Selection: FPM	Capital Cost (Millions $): SO_2	NO_x	HCl	Hg	CPM	FPM	Total Projected Capital Cost (2011$)
Coleman Unit C01	None*	Advanced Burners	HCl level is below anticipated MACT limits. Installation of an HCl monitor is needed since SO2 can not be used as a surrogate.**	Activated Carbon Injection	Hydrated Lime - DSI	Advanced Electrodes & High Frequency TR Sets	0.00	[illegible]	[illegible]	[illegible]	0.00	2.72	[illegible]
Coleman Unit C02	None*	Advanced Burners	HCl level is below anticipated MACT limits. Installation of an HCl monitor is needed since SO2 can not be used as a surrogate.**	Activated Carbon Injection	Hydrated Lime - DSI	Advanced Electrodes & High Frequency TR Sets	0.00	[illegible]	[illegible]	[illegible]	0.00	2.72	[illegible]
Coleman Unit C03	None*	Advanced Burners	HCl level is below anticipated MACT limits. Installation of an HCl monitor is needed since SO2 can not be used as a surrogate.**	Activated Carbon Injection	Hydrated Lime - DSI	Advanced Electrodes & High Frequency TR Sets	0.00	[illegible]	[illegible]	[illegible]	0.00	2.72	[illegible]
Wilson Unit W01	New Tower Scrubber - [illegible]% removal	None	Higher L/G or new tower for increased SO2 removal to below 0.2 lb/mmBtu will permit reporting SO2 data as prima facie evidence of compliance with HCl emission limits	Activated Carbon Injection & New SCR Catalyst	Low Oxidation SCR catalyst + Hydrated Lime - DSI Control NH3 slip from SCR	Advanced Electrodes & High Frequency TR Sets	[illegible]	0.00	0.00	[illegible]	0.00	[illegible]	[illegible]
Green Unit G01	None	None	HCl Monitor is not required since SO2 is below 0.2 lb/mmBtu	Activated Carbon Injection	Hydrated Lime - DSI	Potential ESP Upgrades Due to ACI and DSI	0.00	[illegible]	[illegible]	[illegible]	0.00	[illegible]	[illegible]
Green Unit G02	None	SCR @ [illegible]% Removal	HCl Monitor is not required since SO2 is below 0.2 lb/mmBtu	Activated Carbon Injection	Hydrated Lime - DSI	Potential ESP Upgrades Due to ACI and DSI	0.00	[illegible]	[illegible]	[illegible]	0.00	[illegible]	[illegible]
HMP&L Unit H01	Run both pumps & spray levels, install 3rd pump as spare	None	Higher L/G for increased SO2 removal to below 0.2 lb/mmBtu will permit reporting SO2 data as prima facie evidence of compliance with HCl emission limits	None needed due to oxidation across SCR and WFGD	Low Oxidation SCR catalyst + Hydrated Lime - DSI Control NH3 slip from SCR	ESP Maintenance / Possible Upgrade	[illegible]	0.00	0.00	0.00	0.00	[illegible]	$11,700,000
HMP&L Unit H02	Run both pumps & spray levels, install 3rd pump as spare	None	Higher L/G for increased SO2 removal to below 0.2 lb/mmBtu will permit reporting SO2 data as prima facie evidence of compliance with HCl emission limits	None needed due to oxidation across SCR and WFGD	Low Oxidation SCR catalyst + Hydrated Lime - DSI Control NH3 slip from SCR	ESP Maintenance / Possible Upgrade	[illegible]	0.00	0.00	0.00	0.00	[illegible]	$11,700,000
Reid Unit R01*	Natural Gas with Existing Burners	Natural Gas with Existing Burners	Natural Gas with Existing Burners	Natural Gas with Existing Burners	Natural Gas with Existing Burners	Natural Gas with Existing Burners	1.20						$1,200,000
Reid Unit RT	None	None	None	None	None	None	0.00						$0
TOTAL							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

*Note SO2 emissions in this scenario have been adjusted to reflect recent data received from BREC confirming that the Coleman FGD is capable of producing emission rates of 0.25lb/MMBtu and reaching removal rates of approximately 98%

**Note four (4) HCl monitors are required for Coleman. One (1) for the common WFGD stack and one (1) for each unit bypass stack.

EPA 316(b) REGULATIONS FOR COOLING WATER INTAKES

The existing intake screens at Coleman and Sebree are not equipped with fish buckets or return systems, and the intake velocities approaching the screens are approximately 1.8 and 2.3 feet per second (fps), respectively, at the low water level. This study evaluated several different technologies that provide for compliance with these proposed regulations, including new screen designs and conversion to closed cycle cooling. Since the proposed regulations do not mandate a conversion to closed cycle cooling, it is recommended that replacement intake screens be installed. The recommended screen technology based on an evaluation of capital and O&M costs is a rotating circular intake screen with fish pumps to meet the expected impingement mortality reduction. The estimated capital cost of these screens is $1.33M for each of the Coleman units and $2.05M for Sebree. Projected annual O&M costs are estimated to be $250,000 per unit at Coleman and $370,000 at Sebree.

COAL COMBUSTION RESIDUAL HANDLING & WASTE WATER EFFLUENTS

Assuming Subtitle D is promulgated, modifications would be required at Coleman, HMP&L, and Green to comply. Although continued operation of the existing bottom ash dewatering ponds may be possible under the new regulations, this is not expected to be practical due to requirements for pond modifications (liner and groundwater monitoring system installation) and pending wastewater discharge standards that will likely necessitate treatment or elimination of the ash pond discharge streams. As such, a conversion to a dry bottom ash system using submerged scraper conveyors (SSCs) is recommended. The resulting NPV associated with SSC installation and closure of the existing ash ponds is provided below.

Table ES-7 — Coal Combustion Residue Compliance Summary

Station	Technology Selected	Capital Cost (2011$ Millions)	NPV (2011$ Millions)
Coleman	Dry Bottom Conversion – Remote SSC & Fly Ash Conversion to Dry Pneumatic	$38 0	$45.6
Wilson	None	N/A	N/A
Green	Dry Bottom Conversion – Remote SSC	$28 0	$37 0
HMP&L	Dry Bottom Conversion – Remote SSC	$28.0	$34 1
Reid	None	N/A	N/A

Last page of Executive Summary.

EXHIBIT A-4

McNees
Wallace & Nurick LLC

777 North Capitol Street • Suite 401
Washington, DC 20002-4292

Robert A. Weishaar, Jr
Direct Dial: 202 898 5700
Direct Fax: 717.260.1765
E-mail rweishaa@mwn com

September 19, 2013

Mr. Jeffrey Small, Esq.
Midcontinent Independent System
Operator, Inc.
720 City Center Drive
Carmel, IN 46032

RE: Coleman System Support Resource ("SSR") Agreement And Cost Support

Dear Mr. Small:

This purpose of this letter is to provide Century Aluminum of Kentucky General Partnership's ("Century") comments on Big Rivers Electric Corporation's ("Big Rivers") proposed changes to the pro forma SSR Agreement and Big Rivers' proposed cost support for an SSR arrangement for certain units at Big Rivers' Kenneth C. Coleman Station ("Coleman"). Big Rivers submitted its proposed changes to the pro forma SSR Agreement on September 13, 2013, and submitted its cost support on September 16, 2013.

Century provides these comments in the hopes of achieving an amicable resolution, with Big Rivers and MISO, of all issues prior to the filing of the SSR Agreement with the Federal Energy Regulatory Commission ("FERC"). Century reserves its right to file a protest of the SSR Agreement filing, if necessary, to address any unresolved issues in the FERC proceeding. Century is available to meet, in person or telephonically, to resolve outstanding issues.

Background

Century and Big Rivers are parties to several agreements that have been filed with, and approved by, the Kentucky Public Service Commission ("PSC"). Of these agreements, the Direct Agreement (attached) addresses SSR status for Coleman, and imposes on Century full responsibility for any SSR costs that are allocated to the Big Rivers Local Balancing Authority ("LBA"). MISO's Draft Attachment Y Study, dated July 18, 2013, concludes that 99.5% of all Coleman SSR costs are to be allocated to the Big Rivers LBA. Consequently, based on the analysis as it currently stands, Century will be directly responsible for 99.5% of all Coleman SSR costs.

As you may be aware, Century is the owner and operator of an aluminum smelter in Hawesville, Kentucky. Pursuant to PSC-approved agreements, Century is currently purchasing electricity supply, through Big Rivers and through Century's distribution provider Kenergy Corp. The price of electricity plays a significant role in the competitiveness of the Hawesville Smelter. Minimizing the price of electricity, including SSR costs, is critical to the viability of the Hawesville Smelter. To emphasize this point, Century is attaching to this letter the August 16, 2013 Worker Adjustment and Retraining Notification Act ("WARN") Notice that Century sent to the Kentucky Division of Workforce and Employment Services. The WARN Notice confirms that failure to obtain the necessary regulatory approvals for Century's proposals to address SSR issues will result in curtailment of all operations at the Hawesville Smelter and nearly 700 employees will be laid off. Century has a strong incentive to minimize the duration of any SSR arrangement and the level of costs it incurs during any SSR arrangement. Century's position in this regard coincides with FERC's well-established policy of minimizing the duration, scope, and extent of SSR and other reliability must-run arrangements.

Exploration of "Feasible Alternatives"

Section 38.2.7.(c) of the MISO Tariff obligates MISO to "assess . . . feasible alternatives to the proposed SSR Agreement." Century has provided information to demonstrate that an SSR Agreement is not necessary for all three Coleman units, and to demonstrate that an SSR Agreement is not necessary for any Coleman unit beyond May 30, 2014. To be clear, if the SSR Agreement is not terminated by May 30, 2014, certain capital investments in the Coleman units would become necessary, and the pass-through to Century of the costs of those capital investments would force the closure of the Hawesville Smelter.

An SSR Agreement Should Include Only Coleman Units 2 and 3

Century provided to MISO, on September 13, 2013, an analysis by Siemens PTI showing that only two of the three Coleman units will be needed for reliability. Century seeks MISO's timely confirmation that Coleman Unit 1 does not need to be included in the SSR Agreement. As evident from the SSR cost summary provided by Big Rivers, and in particular the Non-Labor O&M spreadsheet, a maintenance outage for Coleman Unit 1 is scheduled for October 2013. Total expenses for that outage are projected to exceed $1.5 million. Century seeks MISO's timely confirmation that Coleman Unit 1 will not be included in the SSR Agreement, so that these maintenance expenses may be avoided.

An SSR Agreement Is Not Needed After Century Implements Its Package of Options

Century has also identified to MISO and Big Rivers a package of options that, if implemented, would be feasible alternatives to an SSR Agreement. The package includes a protective relays scheme (or "Special Protection Scheme" – SPS), capacitor banks at the Hawesville Smelter, and live-line maintenance. The agreements between Big Rivers and Century to implement a protective relays scheme and for Century to install capacitor banks are attached. During the PSC proceeding in which the PSC approved several agreements comprising

the Century Transaction, Century presented testimony from Donald Morrow, an expert on transmission operations, attesting that use of live-line transmission maintenance is consistent with good and prudent utility practice. Mr. Morrow's testimony is attached. Based on Mr. Morrow's testimony, the PSC found in its August 14, 2013 Order (at page 14) that "the evidence before us shows that live line transmission maintenance is consistent with good and reasonable utility practice." MISO should require Big Rivers to use live-line transmission maintenance for planned transmission maintenance on the lines affected by the Coleman suspension notice, as a component of a package of options to avoid the need for SSR arrangements beyond May 30, 2014, and to minimize curtailment of firm transmission service to Century both before and after May 30, 2014.

Siemens PTI presented to MISO, on August 21, 2013, an analysis showing that implementation of the package of options mentioned above is sufficient to prevent thermal overloads and voltage collapse when the Coleman units are not running. At that meeting, MISO requested that Siemens PTI conduct additional sensitivity analyses of voltage stability under certain additional load conditions. Siemens PTI conducted these analyses and presented its results to MISO on September 13, 2013. Siemens PTI concluded that "The stability studies with detailed Century load models and assumed BREC load models indicate that there is no voltage collapse, and that a reduction in load at Hawesville helps to achieve proper voltage values within the expected timeframe."

Siemens PTI's analyses confirm that upon implementation of the package of options, the SSR Agreement may be terminated. Century fully intends to have the package in place and available no later than May 30, 2014, which would allow the termination of the SSR Agreement at that time. Accordingly, Century seeks MISO's confirmation that implementation of the package of options – installation of an SPS, installation of capacitor banks, and use of live-line maintenance – will enable the suspension of all Coleman units without the need for an SSR Agreement and without the need to curtail the Hawesville Smelter load below 482 MWs except as specified in the SPS. Century requests that MISO revise the Draft Attachment Y Study Results that MISO issued on July 18, 2013 to align with the results of these additional analyses.

SSR Agreement

Century has coordinated with Big Rivers to offer input on the draft SSR Agreement. Big Rivers has adopted several of Century's proposed changes. Listed below are the few issues that Big Rivers and Century were unable to resolve, and for which Century requests MISO's consideration.

- Section 1.C.: Century does not agree that all three Coleman units should be included in the SSR Agreement. The Siemens PTI analysis indicates that, at most, Coleman Units 2 and 3 are necessary until the package of options discussed above can be implemented. The SSR Agreement should include only Coleman Units 2 and 3.

- Section 1.H.: Century was not aware, before Big Rivers submitted its SSR Agreement changes to MISO, that Big Rivers is proposing that none of the Coleman units may be started more than 1 time per week. Century is concerned that unduly limiting the availability of the Coleman units may require MISO to curtail Century's load during the SSR term, and force the closure of the smelter, notwithstanding Century's payment of 99.5% of SSR costs. MISO should either confirm that Century's load will not be curtailed if the Coleman units must be started more than once a week, or reject Big Rivers' proposed limitation.

- Section 3.D.: Because Century is paying 99.5% of the costs under this SSR Agreement, Century requests that any notice given to either party be given to Century also.

- Section 8.B.: Century requests that MISO identify, in the SSR Agreement and/or in the MISO Tariff, the provisions that obligate Big Rivers to maximize the availability of the SSR units during the SSR term, consistent with good utility practice. Section 8.B. of the draft SSR Agreement does not clearly impose that obligation.

- Section 9.E.: Century would prefer that the term "Misconduct Event" be replaced with the term "Non-Delivery Event" due to the possibility that the term "Misconduct Event" may be construed or implied to constitute a violation of the anti-manipulation provisions of the Federal Power Act and FERC regulations.

- Section 9.F. (should be Section 9.G.): Century reserves the right to comment on draft language, to be included in the SSR Agreement or to be included in the Schedule 43 applicable to Coleman, regarding the flow-through of charges/credits to load-serving entities ("LSEs"). As evident from its notes in the Agreement, Big Rivers agrees that this issue must be addressed prior to the filing of the SSR Agreement.

- Section 10.A.2.b.: If Big Rivers becomes bankrupt, MISO should be relieved of its obligations under the SSR Agreement only if such bankruptcy precludes Big Rivers from performing its obligations under the SSR Agreement. Century is concerned that, if Big Rivers becomes bankrupt during the SSR term, MISO may be inclined to exercise its right to terminate the SSR Agreement and then satisfy reliability objectives by curtailing Century's load. Until the package of feasible alternatives is implemented, Big Rivers should remain obligated to provide SSR service from Coleman Units 2 and 3 unless Big Rivers is legally or operationally prevented from performing its obligations. To address this concern vis-à-vis bankruptcy, Century proposes that the following clause be added to Section 10.A.2.b.: ". . . , but only if such bankruptcy prevents Participant's performance of its obligations under this Agreement."

- Exhibit 2.B.: Century reserves the right to comment on draft language regarding the definition of Production Cost and Operating Reserve Cost. Generally, the language in Section B of Exhibit 2 must make clear that Production Cost will be paid for Actual Energy Injections, and Operating Reserve Cost will be paid for the provision of Operating Reserves. The first sentence in Section B, for example, suggests that both Production Cost and Operating Reserve Cost would be paid for Actual Energy Injections. As evident from its notes in the Agreement, Big Rivers agrees that a further understanding of Production Costs and Operating Reserve Costs is needed prior to the filing of the SSR Agreement.

SSR Costs

Big Rivers shared with Century, and sought Century's feedback on, the SSR cost summary that Big Rivers sent to MISO on September 16, 2013. Big Rivers and Century were able to resolve several differences regarding cost recoverability. However, as was the case with the SSR Agreement, Big Rivers and Century were unable to resolve several issues, listed below.

- Return on Net Rate Base: Century does not agree with the allowance of a return on Net Rate Base. Big Rivers is a member-owned, not-for-profit, generation and transmission cooperative. As such, Big Rivers is unlike other unit owners that have entered into, or may be subject to, an SSR Agreement with MISO. If a return is to be allowed, Century does not agree that the return should be 7.85%. Rather, any return percentage should reflect Big Rivers' actual cost of Rural Utilities Service financing.

- Non-Labor O&M: Because only two Coleman units are needed, and Units 2 and 3 are sufficient, all Non-Labor O&M expense associated with Coleman Unit 1 and Coleman Unit 1 outages should be removed from the SSR costs.

- Headquarters Portion G&A: Century does not agree that Headquarters G&A should be allocated only to Big Rivers' generation plant, as Big Rivers proposes. Big Rivers has not demonstrated why Headquarters G&A should not be allocated to Big Rivers' transmission plant also.

- Capital Costs: All capital costs associated with Unit 1 must be removed.

- Property Insurance and Property Taxes: Century's understanding, based on discussions with Big Rivers, is that the amounts shown for property insurance and property taxes are directly related to the Coleman units. Century seeks confirmation of this assertion, and confirmation that only amounts attributable or allocated to Coleman Units 2 and 3 are included.

* * *

Thank you for your consideration of these concerns. Please contact me at your convenience to discuss next steps.

Very truly yours,

McNEES WALLACE & NURICK LLC

/s/ Robert A. Weishaar, Jr.

By

Robert A. Weishaar, Jr.

Counsel to Century Aluminum of Kentucky General Partnership

cc: Kyle Drefke (Orrick)
Cory Lankford (Orrick)
Bob Berry (Big Rivers)

Century ALUMINUM

KEC

REPORT ON BIG RIVERS' TRANSMISSION OUTAGES

Prepared by Kestler Energy Consulting, LLC

November 7, 2013

METHODOLOGY OVERVIEW

2

- Attached is BREC's Aluminum Smelter Notification Procedures (for notice of transmission and generation outages.)
- The following pages identify:
  - the sources of the publicly available data for transmission outage postings at MISO and reported day-ahead and real-time MISO market prices,
  - the method for extracting the BREC transmission postings and the prices at the BREC.Century node,
  - a list of the 116 separate Hot Line Transmission Maintenance Work (HLW) events posted by BREC to MISO for 2013 through October, and
  - all Transmission Line Maintenance events, both HLW and Out-of Service Work (OOS) for the period October 21-26

SOURCE OF MISO MARKET PRICES

3

- KEC gathered MISO market price data from the publically accessible MISO website (misoenergy.org) in the "Market Reports" tab.
- "Market Reports" offer analysis and status of market operations related to all aspects of real-time and day-ahead energy and ancillary services markets and reliability coordination for the region.
- "Market Reports" includes a query tool for accessing particular data for specific dates.
- KEC utilized the query tool to download historical market prices (Day-ahead and Real-Time Locational Marginal Prices [the "LMPs"]) for all days in October, 2013, including those days in which Century experienced unusually high market prices for their Hawesville plant.
  - Market prices are available for all pricing nodes in MISO.
  - Real-Time market prices are stored as "Real-Time Preliminary Market LMPs (csv)" files .
  - Day-Ahead market prices are stored as "Day-Ahead Market LMPs (csv)" files.
- The LMP is comprised of the Marginal Energy Component (MEC), the Marginal Congestion Component (MCC), and the Marginal Loss Component (MLC)
  - The MEC reflects the cost of energy in an unconstrained (no congestion or losses) system.
  - The MCC reflects the financial cost of transmission congestion resulting from the flow of energy at a particular point on the MISO system.
  - The MLC represents the financial cost of transmission line losses resulting from the flow of energy at a particular point on the MISO system.

SOURCE OF MISO TRANSMISSION OUTAGE REPORTS

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- KEC gathered MISO transmission outage information from the MISO OATI WebOASIS website (https://www.oasis.oati.com/MISO/index.html), under the "Outages" tab.
- The WebOASIS website is available through the MISO Market Portal website (https://markets.midwestiso.org/MISO/), under the "Scheduling Apps, OATI OASIS login" tab. Access is restricted to entities having a Certificate issued by OATI. Century has such a Certificate.
- The "Outages" tab contains two additional tabs:
  - "Outages", which contains "Planned Transmission Outage Reports" and "Yearly Historical Outage Reports"
  - "Real Time Outages", which contains "Real Time Outage Reports"
- "Planned Transmission Outage Reports ("PTORs")" are produced hourly and show planned transmission outage information as well as completed outages for the previous 72 hour period.
  - Per MISO, the entity operating the outage equipment (the "Company") is responsible for scheduling and submitting planned transmission outages into the report.
- BREC planned outages stipulating taking the transmission element **Out of Services ("OOS")**, as well as work to be performed without taking the transmission element out of service, otherwise known as **Hot Line Work ("HLW")**.
- "Yearly Historical Outage Reports ("YHORs")" contain transmission outages that were actually closed during the year.
  - Note that not all information from the "Planned Transmission Outage Reports" is put into the "Yearly Historical Outage Report", and it is not uncommon to see discrepancies in what was originally planned, and what was ultimately completed/reported. KEC has PTORs for 10/23 and 10/24 which differ from the YHOR data for those days.
- KEC reviewed all planned outage information in the YHORs denoting BREC as the "Company", then focused on outages planned for those days in October in which Century experienced unusually high market prices for their Hawesville plant.

SOURCE OF MISO COLEMAN OUTAGE INFORMATION

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- KEC was provided Coleman unit outage information by Century.
- Coleman unit outage data is provided to Century by BREC, and recorded in Century's Rectifier Daily Log Form.
  - Information reported by BREC is not always provided on a timely basis, and may not include a time-stamp for the relevant event.
  - It unclear in some cases, whether the log has recorded the time that a Coleman outage occurred or the time that the event was reported to Century.
  - This may explain some minor discrepancies in the correlation between Coleman outages and market prices.

CenturyALUMINUM

KEC

2013 SCHEDULED HOT LINE WORK THRU OCTOBER

6

Outage Request ID	Company	KV	From Station	To Station	BREC Equipment Name	EMS Equipment Name	Planned Start	Planned End	Request Status	Actual Start	Actual End	Priority	Equipment Status	Common Name	Equipment Type	From CA	To CA	Request Date
[illegible]	BREC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Opportunity	[illegible]	Hopkins Co. to Caldwell Co. 161	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Sullivan-National Aluminum 161 kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Sullivan-National Aluminum 161 kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Daviess Co. to [illegible] 161	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Meade Co. to Hardinsburg	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	HMPL TP	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	HMPL TAP to HMPL 4	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	HMPL TP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Henderson Co. To HMPL Tap	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	HMPL TP	REID	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Reid-HMPL Sub 4 Tap 161 kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	COLEMAN	[illegible]	COLEM_C2	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Coleman 161-Coleman EHV C-2 line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	COLEMAN	[illegible]	COLEM_C1	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Coleman 161-Coleman EHV C-1 line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	COLEMAN	[illegible]	COLEM_C1	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Coleman 161-Coleman EHV C 1 line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	COLEMAN	[illegible]	COLEM_C1	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Coleman 161-Coleman EHV C-1 line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	COLEMAN	[illegible]	COLEM_C1	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Coleman 161-Coleman EHV C-1 line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Daviess Co.-Hancock Co. 161 kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Daviess Co.-Hancock Co. 161 kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Daviess Co.-Hancock Co. 161 kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Daviess Co.-Hancock Co. 161 kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Daviess Co.-Hancock Co. 161 kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	REID	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Reid-Daviess Co. 161kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC	161	[illegible]	DAVIESS	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Daviess Co.-Hancock Co. 161 kV line	Line	BREC	BREC	[illegible]
[illegible]	BREC, LGEE	138	[illegible]	CLOVERPO	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Hardinsburg to Cloverport 138 kV Line	Line	BREC	LGEE	[illegible]
[illegible]	BREC, LGEE	138	[illegible]	CLOVERPO	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Hardinsburg to Cloverport 138 kV Line	Line	BREC	LGEE	[illegible]
[illegible]	BREC, LGEE	138	[illegible]	CLOVERPO	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Hardinsburg to Cloverport 138 kV Line	Line	BREC	LGEE	[illegible]
[illegible]	BREC, LGEE	138	[illegible]	CLOVERPO	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Hardinsburg to Cloverport 138 kV Line	Line	BREC	LGEE	[illegible]
[illegible]	BREC, LGEE	138	[illegible]	CLOVERPO	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Hardinsburg to Cloverport 138 kV Line	Line	BREC	LGEE	[illegible]
[illegible]	BREC, LGEE	138	[illegible]	CLOVERPO	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Emergency	[illegible]	Hardinsburg to Cloverport 138 kV Line	Line	BREC	LGEE	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]
[illegible]	BREC, SPC	161	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Completed	[illegible]	[illegible]	Planned	[illegible]	Livingston Co. to [illegible] 161	Line	BREC	SPC	[illegible]

Century ALUMINUM

KEC

2013 SCHEDULED HOT LINE WORK THRU OCTOBER

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Outage Request ID	Company	CV	From Station	To Station	KEC Equipment Name		TVA Equipment Name	Planned Start	Planned End	Request Status	Actual Start	Actual End	Priority	Equipment Name	Common Name	Movement Type From CA	To CA	Request Date
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-17T08:00:00Z	2013-08-17T16:00:00Z	Completed	2013-08-17T08:00:00Z	2013-08-17T16:00:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-13T08:00:00Z	2013-08-16T16:00:00Z	Completed	2013-08-13T08:54:00Z	2013-08-13T16:35:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-14T08:00:00Z	2013-08-14T16:00:00Z	Completed	2013-08-14T07:47:00Z	2013-08-14T17:04:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-16T08:00:00Z	2013-08-16T16:00:00Z	Completed	2013-08-16T07:57:00Z	2013-08-17T07:00:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-17T08:00:00Z	2013-08-17T16:00:00Z	Completed	2013-08-17T08:51:00Z	2013-08-17T17:25:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-19T08:00:00Z	2013-08-19T16:00:00Z	Completed	2013-08-19T08:56:00Z	2013-08-19T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-19T08:00:00Z	2013-08-19T16:00:00Z	Completed	2013-08-19T07:00:00Z	2013-08-19T17:15:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-20T08:00:00Z	2013-08-20T16:00:00Z	Completed	2013-08-20T08:58:00Z	2013-08-20T16:12:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-21T08:00:00Z	2013-08-21T16:00:00Z	Completed	2013-08-21T08:56:00Z	2013-08-21T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-25T08:00:00Z	2013-08-25T16:00:00Z	Completed	2013-08-25T07:55:00Z	2013-08-25T17:01:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-24T08:00:00Z	2013-08-24T16:00:00Z	Completed	2013-08-24T07:57:00Z	2013-08-24T17:00:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-26T08:00:00Z	2013-08-26T16:00:00Z	Completed	2013-08-26T07:54:00Z	2013-08-26T16:35:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-27T08:00:00Z	2013-08-27T16:00:00Z	Completed	2013-08-27T08:53:00Z	2013-08-27T17:00:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-28T08:00:00Z	2013-08-28T16:00:00Z	Completed	2013-08-28T08:56:00Z	2013-08-28T17:14:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-08-30T08:00:00Z	2013-08-30T16:00:00Z	Completed	2013-08-30T07:59:00Z	2013-08-30T17:02:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-03T08:00:00Z	2013-09-03T16:00:00Z	Completed	2013-09-03T08:54:00Z	2013-09-03T17:06:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-04T08:00:00Z	2013-09-04T16:00:00Z	Completed	2013-09-04T07:59:00Z	2013-09-04T16:26:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-05T08:00:00Z	2013-09-05T16:00:00Z	Completed	2013-09-05T08:51:00Z	2013-09-05T16:35:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-06T08:00:00Z	2013-09-06T16:00:00Z	Completed	2013-09-06T07:54:00Z	2013-09-06T16:38:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-09T08:00:00Z	2013-09-09T16:00:00Z	Completed	2013-09-09T08:27:00Z	2013-09-09T17:13:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-10T08:00:00Z	2013-09-10T16:00:00Z	Completed	2013-09-10T08:24:00Z	2013-09-10T16:58:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-11T08:00:00Z	2013-09-11T16:00:00Z	Completed	2013-09-11T08:21:00Z	2013-09-11T16:36:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-12T08:00:00Z	2013-09-12T16:00:00Z	Completed	2013-09-12T08:49:00Z	2013-09-12T16:37:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-13T08:00:00Z	2013-09-13T16:00:00Z	Completed	2013-09-13T08:56:00Z	2013-09-13T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-16T08:00:00Z	2013-09-16T16:00:00Z	Completed	2013-09-16T08:55:00Z	2013-09-16T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-17T08:00:00Z	2013-09-17T16:00:00Z	Completed	2013-09-17T08:54:00Z	2013-09-17T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-18T08:00:00Z	2013-09-18T16:00:00Z	Completed	2013-09-18T08:56:00Z	2013-09-18T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-19T08:00:00Z	2013-09-19T16:00:00Z	Completed	2013-09-19T08:54:00Z	2013-09-19T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-20T08:00:00Z	2013-09-20T16:00:00Z	Completed	2013-09-20T08:56:00Z	2013-09-20T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-23T08:00:00Z	2013-09-23T16:00:00Z	Completed	2013-09-23T08:54:00Z	2013-09-23T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-24T08:00:00Z	2013-09-24T16:00:00Z	Completed	2013-09-24T08:56:00Z	2013-09-24T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-25T08:00:00Z	2013-09-25T16:00:00Z	Completed	2013-09-25T08:54:00Z	2013-09-25T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-26T08:00:00Z	2013-09-26T16:00:00Z	Completed	2013-09-26T08:56:00Z	2013-09-26T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-27T08:00:00Z	2013-09-27T16:00:00Z	Completed	2013-09-27T08:54:00Z	2013-09-27T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-09-30T08:00:00Z	2013-09-30T16:00:00Z	Completed	2013-09-30T08:56:00Z	2013-09-30T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-01T08:00:00Z	2013-10-01T16:00:00Z	Completed	2013-10-01T08:54:00Z	2013-10-01T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-02T08:00:00Z	2013-10-02T16:00:00Z	Completed	2013-10-02T08:56:00Z	2013-10-02T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-03T08:00:00Z	2013-10-03T16:00:00Z	Completed	2013-10-03T08:54:00Z	2013-10-03T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-04T08:00:00Z	2013-10-04T16:00:00Z	Completed	2013-10-04T08:56:00Z	2013-10-04T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-07T08:00:00Z	2013-10-07T16:00:00Z	Completed	2013-10-07T08:54:00Z	2013-10-07T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-08T08:00:00Z	2013-10-08T16:00:00Z	Completed	2013-10-08T08:56:00Z	2013-10-08T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-09T08:00:00Z	2013-10-09T16:00:00Z	Completed	2013-10-09T08:54:00Z	2013-10-09T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-10T08:00:00Z	2013-10-10T16:00:00Z	Completed	2013-10-10T08:56:00Z	2013-10-10T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-11T08:00:00Z	2013-10-11T16:00:00Z	Completed	2013-10-11T08:54:00Z	2013-10-11T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-14T08:00:00Z	2013-10-14T16:00:00Z	Completed	2013-10-14T08:56:00Z	2013-10-14T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-15T08:00:00Z	2013-10-15T16:00:00Z	Completed	2013-10-15T08:54:00Z	2013-10-15T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-16T08:00:00Z	2013-10-16T16:00:00Z	Completed	2013-10-16T08:56:00Z	2013-10-16T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-17T08:00:00Z	2013-10-17T16:00:00Z	Completed	2013-10-17T08:54:00Z	2013-10-17T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-18T08:00:00Z	2013-10-18T16:00:00Z	Completed	2013-10-18T08:56:00Z	2013-10-18T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-21T08:00:00Z	2013-10-21T16:00:00Z	Completed	2013-10-21T08:54:00Z	2013-10-21T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-22T08:00:00Z	2013-10-22T16:00:00Z	Completed	2013-10-22T08:56:00Z	2013-10-22T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-23T08:00:00Z	2013-10-23T16:00:00Z	Completed	2013-10-23T08:54:00Z	2013-10-23T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-24T08:00:00Z	2013-10-24T16:00:00Z	Completed	2013-10-24T08:56:00Z	2013-10-24T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-25T08:00:00Z	2013-10-25T16:00:00Z	Completed	2013-10-25T08:54:00Z	2013-10-25T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-28T08:00:00Z	2013-10-28T16:00:00Z	Completed	2013-10-28T08:56:00Z	2013-10-28T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-29T08:00:00Z	2013-10-29T16:00:00Z	Completed	2013-10-29T08:54:00Z	2013-10-29T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-30T08:00:00Z	2013-10-30T16:00:00Z	Completed	2013-10-30T08:56:00Z	2013-10-30T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-10-31T08:00:00Z	2013-10-31T16:00:00Z	Completed	2013-10-31T08:54:00Z	2013-10-31T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-01T08:00:00Z	2013-11-01T16:00:00Z	Completed	2013-11-01T08:56:00Z	2013-11-01T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-04T08:00:00Z	2013-11-04T16:00:00Z	Completed	2013-11-04T08:54:00Z	2013-11-04T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-05T08:00:00Z	2013-11-05T16:00:00Z	Completed	2013-11-05T08:56:00Z	2013-11-05T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-06T08:00:00Z	2013-11-06T16:00:00Z	Completed	2013-11-06T08:54:00Z	2013-11-06T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-07T08:00:00Z	2013-11-07T16:00:00Z	Completed	2013-11-07T08:56:00Z	2013-11-07T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-08T08:00:00Z	2013-11-08T16:00:00Z	Completed	2013-11-08T08:54:00Z	2013-11-08T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-11T08:00:00Z	2013-11-11T16:00:00Z	Completed	2013-11-11T08:56:00Z	2013-11-11T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-12T08:00:00Z	2013-11-12T16:00:00Z	Completed	2013-11-12T08:54:00Z	2013-11-12T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-13T08:00:00Z	2013-11-13T16:00:00Z	Completed	2013-11-13T08:56:00Z	2013-11-13T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-14T08:00:00Z	2013-11-14T16:00:00Z	Completed	2013-11-14T08:54:00Z	2013-11-14T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-15T08:00:00Z	2013-11-15T16:00:00Z	Completed	2013-11-15T08:56:00Z	2013-11-15T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-18T08:00:00Z	2013-11-18T16:00:00Z	Completed	2013-11-18T08:54:00Z	2013-11-18T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-19T08:00:00Z	2013-11-19T16:00:00Z	Completed	2013-11-19T08:56:00Z	2013-11-19T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-20T08:00:00Z	2013-11-20T16:00:00Z	Completed	2013-11-20T08:54:00Z	2013-11-20T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-21T08:00:00Z	2013-11-21T16:00:00Z	Completed	2013-11-21T08:56:00Z	2013-11-21T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-22T08:00:00Z	2013-11-22T16:00:00Z	Completed	2013-11-22T08:54:00Z	2013-11-22T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-25T08:00:00Z	2013-11-25T16:00:00Z	Completed	2013-11-25T08:56:00Z	2013-11-25T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-26T08:00:00Z	2013-11-26T16:00:00Z	Completed	2013-11-26T08:54:00Z	2013-11-26T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-27T08:00:00Z	2013-11-27T16:00:00Z	Completed	2013-11-27T08:56:00Z	2013-11-27T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-11-29T08:00:00Z	2013-11-29T16:00:00Z	Completed	2013-11-29T08:54:00Z	2013-11-29T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-12-02T08:00:00Z	2013-12-02T16:00:00Z	Completed	2013-12-02T08:56:00Z	2013-12-02T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-12-03T08:00:00Z	2013-12-03T16:00:00Z	Completed	2013-12-03T08:54:00Z	2013-12-03T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-12-04T08:00:00Z	2013-12-04T16:00:00Z	Completed	2013-12-04T08:56:00Z	2013-12-04T16:39:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.00 SWITCH 5	LIVINGSTON_1	2013-12-05T08:00:00Z	2013-12-05T16:00:00Z	Completed	2013-12-05T08:54:00Z	2013-12-05T16:40:00Z	Planned	NLW	Livingston Co. to Henderson 161	Line	KREC	SMC	2013-08-15T08:20:30Z
1-84858857	KREC, SMC	161	LIVINGSTON	HENDERSON	SLAUGHTER	161.

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ALL BREC SCHEDULED OUTAGES FROM 10/21 THRU 10/26

Outage_Request_ID	Company	KV	From_Station	To_Station	DC_Equipment_Name	EMS_Equipment_Name	Planned_Start	Planned_End	Request_Status	Actual_Start	Actual_End	Priority	Equipment_Request_Type	Notes	Common_Name	Equipment_Type	From_CA	To_CA	Request_Date
1-0446196	BREC	161	REID	DAVIESS	SREID 161.00 SDAVIS 161.00 1	REIDDAVIE16_1	2013-10-21T07:30:00Z	2013-10-21T12:00:00Z	Completed	2013-10-21T08:53:00Z	2013-10-21T15:51:00Z	Planned	HLW		Reid-Daviess Co. 161kV line	Line	BREC	BREC	2013-10-17T10:32:16Z
1-0403666	BREC, SIPC	161	LIVINGSR	KENSHAW	SLIVING 161.00 SKENSHW_S 161.00 1	LIVINKENSH16_1	2013-10-21T08:00:00Z	2013-10-21T17:00:00Z	Completed	2013-10-21T06:45:00Z	2013-10-21T16:02:00Z	Planned	HLW		Livingston Co. to Kenshaw 161	Line	BREC	SIPC	2013-07-15T08:20:20Z
1-0446063	BREC, TVA	161	BRYAN2	MARSHAL	SBRYAN 161.00 SMARSHALL 07161.00 1	BRYANMARSH16_1	2013-10-21T08:00:00Z	2013-10-21T12:00:00Z	Completed	2013-10-21T08:54:00Z	2013-10-21T11:01:00Z	Planned	HLW		Bryan-Marshall 161 kV line	Line	BREC	TVA	2013-10-17T13:49:38Z
1-0403666	BREC, SIPC	161	LIVINGSR	KENSHAW	SLIVING 161.00 SKENSHW_S 161.00 1	LIVINKENSH16_1	2013-10-22T08:00:00Z	2013-10-22T17:00:00Z	Completed	2013-10-22T06:28:00Z	2013-10-22T16:36:00Z	Planned	HLW		Livingston Co. to Kenshaw 161	Line	BREC	SIPC	2013-07-15T08:20:20Z
1-0403816	BREC	161	REID	DAVIESS	SREID 161.00 SDAVIS 161.00 1	REIDDAVIE16_1	2013-10-22T08:00:00Z	2013-10-26T16:00:00Z	Completed	2013-10-22T08:28:00Z	2013-10-22T16:20:00Z	Opportunity	OOS		Reid-Daviess Co. 161kV line	Line	BREC	BREC	2013-10-01T06:40:40Z
1-0446556	BREC, TVA	161	MCCRACKE	SMCCRACK	SMCCRACK 161.00 SMCCRACKN TP161.00 1	MCCRASMCCR16_1	2013-10-22T08:30:00Z	2013-10-22T15:30:00Z	Completed	2013-10-22T08:58:00Z	2013-10-22T14:16:00Z	Planned	HLW		McCracken - L Tap 161	Line	BREC	TVA	2013-10-18T12:07:44Z
1-0403666	BREC, SIPC	161	LIVINGSR	KENSHAW	SLIVING 161.00 SKENSHW_S 161.00 1	LIVINKENSH16_1	2013-10-23T08:00:00Z	2013-10-23T17:00:00Z	Completed	2013-10-23T06:53:00Z	2013-10-23T16:20:00Z	Planned	HLW		Livingston Co. to Kenshaw 161	Line	BREC	SIPC	2013-07-15T08:20:20Z
1-0405837	BREC	161	REID	DAVIESS	SREID 161.00 SDAVIS 161.00 1	REIDDAVIE16_1	2013-10-23T08:00:00Z	2013-10-23T16:00:00Z	Completed	2013-10-23T11:25:00Z	2013-10-23T21:26:00Z	Emergency	OOS		Reid-Daviess Co. 161kV line	Line	BREC	BREC	2013-10-22T16:40:00Z
1-0446556	BREC, TVA	161	MCCRACKE	SMCCRACK	SMCCRACK 161.00 SMCCRACKN TP161.00 1	MCCRASMCCR16_1	2013-10-23T08:30:00Z	2013-10-23T15:30:00Z	Completed	2013-10-23T07:06:00Z	2013-10-23T16:22:00Z	Planned	HLW		McCracken - L Tap 161	Line	BREC	TVA	2013-10-18T12:07:44Z
1-0405458	BREC	161	REID	DAVIESS	SREID 161.00 SDAVIS 161.00 1	REIDDAVIE16_1	2013-10-24T07:00:00Z	2013-10-24T17:00:00Z	Completed	2013-10-24T08:11:00Z	2013-10-24T15:42:00Z	Emergency	HLW		Reid-Daviess Co. 161kV line	Line	BREC	BREC	2013-10-23T22:45:20Z
1-0403666	BREC, SIPC	161	LIVINGSR	KENSHAW	SLIVING 161.00 SKENSHW_S 161.00 1	LIVINKENSH16_1	2013-10-24T08:00:00Z	2013-10-24T17:00:00Z	Completed	2013-10-24T07:07:00Z	2013-10-24T16:26:00Z	Planned	HLW		Livingston Co. to Kenshaw 161	Line	BREC	SIPC	2013-07-15T08:20:20Z
1-0446556	BREC, TVA	161	MCCRACKE	SMCCRACK	SMCCRACK 161.00 SMCCRACKN TP161.00 1	MCCRASMCCR16_1	2013-10-24T08:30:00Z	2013-10-24T15:30:00Z	Completed	2013-10-24T07:03:00Z	2013-10-24T16:26:00Z	Planned	HLW		McCracken - L Tap 161	Line	BREC	TVA	2013-10-18T12:07:44Z
1-0405458	BREC	161	REID	DAVIESS	SREID 161.00 SDAVIS 161.00 1	REIDDAVIE16_1	2013-10-25T07:00:00Z	2013-10-25T17:00:00Z	Completed	2013-10-25T07:34:00Z	2013-10-25T15:21:00Z	Emergency	HLW		Reid-Daviess Co. 161kV line	Line	BREC	BREC	2013-10-23T22:45:20Z
1-0403666	BREC, SIPC	161	LIVINGSR	KENSHAW	SLIVING 161.00 SKENSHW_S 161.00 1	LIVINKENSH16_1	2013-10-25T08:00:00Z	2013-10-25T17:00:00Z	Completed	2013-10-25T07:01:00Z	2013-10-25T16:31:00Z	Planned	HLW		Livingston Co. to Kenshaw 161	Line	BREC	SIPC	2013-07-15T08:20:20Z
1-0446556	BREC, TVA	161	MCCRACKE	SMCCRACK	SMCCRACK 161.00 SMCCRACKN TP161.00 1	MCCRASMCCR16_1	2013-10-25T08:30:00Z	2013-10-25T15:30:00Z	Completed	2013-10-25T07:28:00Z	2013-10-25T19:27:00Z	Planned	HLW		McCracken - L Tap 161	Line	BREC	TVA	2013-10-18T12:07:44Z
1-0403666	BREC, SIPC	161	LIVINGSR	KENSHAW	SLIVING 161.00 SKENSHW_S 161.00 1	LIVINKENSH16_1	2013-10-26T08:00:00Z	2013-10-26T17:00:00Z	Completed	2013-10-26T06:52:00Z	2013-10-26T17:37:00Z	Planned	HLW		Livingston Co. to Kenshaw 161	Line	BREC	SIPC	2013-07-15T08:20:20Z
1-0405837	BREC	161	REID	DAVIESS	SREID 161.00 SDAVIS 161.00 1	REIDDAVIE16_1	2013-10-26T08:00:00Z	2013-10-26T16:00:00Z	Completed	2013-10-26T07:06:00Z	2013-10-26T15:41:00Z	Emergency	OOS		Reid-Daviess Co. 161kV line	Line	BREC	BREC	2013-10-22T16:40:00Z
1-0446556	BREC, TVA	161	MCCRACKE	SMCCRACK	SMCCRACK 161.00 SMCCRACKN TP161.00 1	MCCRASMCCR16_1	2013-10-26T08:30:00Z	2013-10-26T15:30:00Z	Completed	2013-10-26T06:41:00Z	2013-10-26T16:24:00Z	Planned	HLW		McCracken - L Tap 161	Line	BREC	TVA	2013-10-18T12:07:44Z

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BREC OUTAGE INFORMATION AND CORRESPONDING MISO MARKET PRICES

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Operating Day 10/21/2013

Denotes a planned outage, actual outage, or Hot Line Work

Denotes relevant market prices during outage events

Outages

	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24
REID : DAVIES Planned OOS																								
REID : DAVIES Planned HLW																								
REID : DAVIES Real-Time OOS																								
Coleman Unit 1 Real-Time OOS																								
Coleman Unit 2 Real-Time OOS																								
Coleman Unit 3 Real-Time OOS																								

Prices

Node	Market	Type	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24	Avg
BREC.CENTURY	DAH	Congestion	$4.38	$4.10	$3.76	$2.88	$2.37	$2.16	$3.44						$0.98	$0.73	$0.48	$0.48	$0.48	-$2.59	-$5.91	-$8.08	-$8.56	-$4.80	$0.87	$1.07	$0.66
		LMP	$28.32	$28.03	$19.84	$28.17	$32.10	$31.88	$45.00	$38.94	$38.88	$36.11	$38.71	$38.03	$34.58	$32.60	$28.78	$28.16	$28.43	$31.91	$43.05	$36.39	$39.78	$28.29	$27.52	$28.32	$31.13
		Loss	$0.47	$0.38	$0.42	$0.37	$0.34	-$0.05	$0.08	-$0.80	-$0.81	-$0.85	$0.84	-$0.82	-$0.34	-$0.81	-$0.85	-$0.87	-$0.88	-$0.17	-$1.19	-$0.80	-$0.93	-$0.47	-$0.44	-$0.11	-$0.33
	RTH	Congestion	$2.63	$0.04	$0.13	$0.22	$0.29	$1.99	$0.95						-$8.67	-$8.71	-$5.48	-$3.82	-$8.78	-$11.63	-$14.98	-$15.27	-$6.63	-$5.41	-$10.21	-$1.62	-$4.56
		LMP	$28.46	$20.04	$20.77	$23.16	$21.13	$28.43	$32.86	$36.38	$48.75	$27.87	$28.43	$28.10	$32.36	$28.73	$24.81	$25.04	$33.91	$92.02	$95.90	$48.86	$31.84	$28.09	$29.00	$25.58	$33.36
		Loss	$0.37	$0.41	$0.53	$0.60	$0.52	$0.13	-$0.26	-$1.05	-$1.92	-$1.39	-$1.00	-$0.88	-$0.82	-$0.77	-$0.55	-$0.35	-$0.81	-$3.13	-$5.53	-$4.29	-$2.27	-$1.29	-$1.38	-$0.71	-$1.66
BREC.BREC	DAH	Congestion	$4.63	$4.29	$3.95	$3.01	$2.53	$2.08	-$0.28	-$2.53	-$2.83	-$2.88	-$2.05	-$0.88	-$0.77	-$0.48	$0.20	$0.22	$0.24	$0.28	$12.16	$14.04	$10.85	$6.82	$1.21	$1.34	$2.88
		LMP	$28.32	$20.01	$19.73	$28.17	$22.02	$31.32	$48.11	$37.32	$37.22	$28.43	$35.41	$34.15	$32.38	$30.53	$28.28	$27.88	$27.97	$43.34	$88.67	$58.12	$47.88	$37.43	$27.57	$28.32	$33.43
		Loss	$0.22	$0.18	$0.17	$0.24	$0.10	-$0.35	-$0.57	-$1.34	-$1.34	-$1.34	-$1.20	-$1.17	-$0.78	-$0.28	-$1.08	-$1.08	-$1.10	-$0.62	-$1.64	-$1.20	-$1.24	-$0.75	-$0.73	-$0.36	-$0.72
	RTH	Congestion	$2.58	$0.04	$0.01	$0.21	$0.27	$1.82	$0.77	-$3.48	-$1.98	-$7.98	-$3.54	-$4.58	-$8.94	-$8.87	-$5.57	-$3.88	-$8.54	-$13.77	-$17.27	-$17.48	-$8.74	-$5.63	-$11.84	-$1.80	-$5.11
		LMP	$28.17	$19.78	$20.36	$22.88	$20.87	$28.91	$32.16	$35.62	$45.50	$28.35	$27.64	$25.65	$31.88	$28.16	$24.45	$24.88	$32.85	$78.73	$92.21	$48.53	$31.15	$25.21	$28.98	$24.92	$32.96
		Loss	$0.13	$0.16	$0.28	$0.33	$0.28	$0.58	-$0.55	-$1.45	-$2.44	-$1.77	-$1.35	-$1.00	-$1.05	-$1.18	-$0.88	-$0.85	-$1.02	-$4.28	-$8.91	-$5.21	-$2.94	-$1.77	-$2.28	-$1.20	-$1.52
MIDWAY.HUB	DAH	Congestion	$3.78	$3.64	$3.44	$2.62	$3.78	$2.78	$3.48	$8.15	$8.36	$8.74	$8.98	$2.53	$2.36	$2.24	$1.77	$1.58	$1.44	$1.32	-$8.34	-$1.85	-$1.85	-$0.85	$0.62	$0.87	$1.53
		LMP	$19.75	$19.42	$19.54	$28.10	$23.83	$32.83	$44.58	$40.84	$41.04	$41.00	$38.48	$38.13	$38.45	$34.03	$30.67	$28.74	$29.88	$38.27	$48.30	$43.60	$36.84	$30.62	$27.71	$28.58	$33.66
		Loss	$0.48	$0.24	$0.44	$0.56	$0.54	$0.47	$0.25	-$0.50	-$0.51	-$0.47	-$0.18	-$0.48	$0.18	$0.51	-$0.27	-$0.38	-$0.38	$0.28	-$0.51	-$0.03	-$0.38	-$0.08	$0.00	$0.27	$0.08
	RTH	Congestion	$2.83	$0.04	$0.38	$3.12	$0.44	$2.28	$1.28	-$2.85	-$8.43	-$6.37	-$2.82	-$4.28	-$8.32	-$8.55	-$5.42	-$3.75	-$8.48	-$11.97	-$14.98	-$15.27	-$6.63	-$5.38	-$10.21	-$1.58	-$4.25
		LMP	$28.70	$20.08	$20.98	$28.66	$21.32	$30.12	$33.48	$37.53	$48.84	$28.81	$28.44	$28.18	$33.58	$27.88	$25.50	$25.63	$34.94	$94.82	$88.80	$51.41	$32.82	$28.55	$29.57	$25.98	$34.03
		Loss	$0.41	$0.43	$0.53	$0.58	$0.56	$0.63	$0.27	-$0.28	-$0.83	-$0.58	-$0.27	$0.00	$0.21	$0.02	$0.07	$0.18	$0.21	-$0.88	-$2.83	-$2.53	-$1.29	-$0.67	-$1.00	-$0.34	-$0.91

Observations – The Reid-Daviess line was scheduled as Hot Line Work and not taken out of service, so there was no detrimental impact on either DA or RT LMPs.

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BREC OUTAGE INFORMATION AND CORRESPONDING MISO MARKET PRICES

To

Operating Day 10/22/2013

Denotes a planned outage, actual outage, or Hot Line Work

Denotes relevant market prices during outage events

Outages

	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24
REID : DAVIES Planned OOS																								
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Coleman Unit 1 Real-Time OOS																								
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Prices

Node	Market	Type	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24	Avg
BREC.CENTURY	DAH	Congestion	-$0.88	-$0.58	-$0.32	-$0.29	$0.57	$0.97	$4.10	-$2.33	-$4.31	-$2.82	-$2.84	-$1.51	$0.17	-$0.83	-$0.67	$0.33	$2.28	-$0.19	-$0.05	-$3.08	-$0.38	-$0.12	$0.10	$0.47	-$0.56
		LMP	$23.54	$23.38	$23.20	$23.72	$25.58	$34.58	$50.97	$43.61																	$34.66
		Loss	$0.08	$0.17	$0.08	$0.08	-$0.03	$0.18	-$1.66	-$2.20	-$2.65	-$2.02	-$0.50	-$0.85	-$0.83	-$0.11	$0.29	$0.27	-$0.19	-$0.12	-$1.65	-$0.85	-$1.88	-$0.10	-$0.43	-$0.51	-$0.56
	RTH	Congestion	-$0.34	$0.38	$0.58	$1.28	$1.25	-$0.01	-$3.19	-$12.66																	$100.66
		LMP	$22.98	$24.54	$25.18	$26.50	$28.01	$28.25	$34.02	$41.94	$482.75	$1,091.02	$516.85	$408.63	$388.67	$884.03	$173.67	$232.17	$835.48	$32.96	$39.61	$31.88	$27.88	$24.10	$22.98	$22.88	$225.19
		Loss	-$0.23	$0.05	$0.09	$0.11	$0.02	-$0.25	-$1.03	-$2.76	-$2.20	-$0.11	-$1.48	-$1.35	-$1.06	-$0.91	-$0.72	-$0.57	-$1.91	-$1.28	-$2.48	-$2.22	-$1.23	-$0.59	-$0.13	$0.14	-$1.91
BREC.BREC	DAH	Congestion	-$0.54	-$0.35	-$0.08	-$0.04	$0.55	$1.30	$4.10	-$4.80	-$8.51	-$3.72	-$4.74	-$3.44	-$2.85	-$2.16	-$1.86	-$1.21	-$0.51	-$2.74	-$4.11	-$8.03	-$3.88	-$1.25	$0.11	$0.48	-$1.83
		LMP	$23.58	$23.38	$23.12	$23.58	$25.32	$34.67	$50.38	$41.02	$36.21	$38.35	$38.77	$38.19	$33.37	$31.48	$30.34	$29.41	$29.64	$33.10	$46.32	$37.52	$33.74	$28.92	$24.58	$24.38	$32.86
		Loss	-$0.24	-$0.07	-$0.24	-$0.24	-$0.28	-$0.07	-$1.85	-$2.72	-$2.54	-$2.59	-$1.41	-$1.32	-$1.23	-$1.34	-$0.30	-$0.28	-$0.75	-$1.43	-$1.48	-$1.48	-$2.24	-$0.48	-$0.76	-$0.92	-$1.08
	RTH	Congestion	-$0.43	$0.28	$0.45	$1.12	$1.08	-$0.15	-$3.33	-$12.43	$76.80	$188.48	$93.41	$71.14	$68.92	$158.58	$25.28	$37.27	$151.51	-$4.58	-$6.84	-$5.12	-$0.58	-$0.31	$0.14	$0.12	$38.12
		LMP	$22.52	$24.08	$24.73	$26.04	$25.47	$27.72	$33.32	$36.80	$128.18	$258.92	$128.92	$108.73	$105.07	$198.77	$58.50	$67.74	$193.33	$32.06	$40.25	$32.03	$27.47	$23.72	$22.83	$22.48	$68.14
		Loss	-$0.60	-$0.30	-$0.22	-$0.21	-$0.34	-$0.65	-$1.58	-$3.62	-$2.92	-$4.23	-$2.00	-$1.95	-$1.81	-$1.44	-$1.15	-$0.97	-$1.58	-$1.84	-$3.31	-$2.80	-$1.71	-$0.94	-$0.41	-$0.14	-$1.53
INDIANA.HUB	DAH	Congestion	-$0.80	-$0.20	$0.03	$0.24	$1.07	$2.88	$3.31	-$1.77	-$3.18	-$1.97	-$1.76	-$0.85	$0.20	-$0.11	-$0.26	-$0.08	-$0.19	$0.21	-$0.93	-$2.07	-$1.23	-$1.07	$0.57	$1.52	-$0.26
		LMP	$23.72	$23.98	$23.67	$24.29	$26.22	$38.85	$51.11	$45.36	$40.94	$41.48	$40.98	$38.00	$37.25	$34.50	$32.41	$31.02	$30.98	$37.08	$50.85	$41.94	$37.85	$29.54	$25.71	$26.16	$34.66
		Loss	$0.18	$0.33	$0.20	$0.21	$0.10	$0.32	-$0.13	-$1.21	-$1.14	-$1.12	-$0.28	-$0.28	-$0.20	-$0.38	$0.19	$0.18	$0.27	-$0.40	-$0.15	-$0.22	-$0.38	-$0.04	-$0.01	-$0.19	-$0.19
	RTH	Congestion	-$0.33	$0.40	$0.66	$1.40	$1.35	$0.04	-$3.15	-$12.06	-$10.58	-$20.26	-$6.96	-$4.82	-$6.55	-$12.15	-$4.58	-$4.78	-$13.53	-$4.16	-$13.98	-$10.70	-$1.88	-$0.28	$0.19	$0.28	-$0.27
		LMP	$23.21	$24.74	$25.41	$26.81	$29.41	$23.78	$34.84	$42.28	$34.56	$51.89	$27.66	$35.08	$30.78	$26.21	$27.59	$28.59	$29.51	$33.78	$34.99	$26.66	$27.45	$24.46	$23.19	$23.13	$28.86
		Loss	-$0.01	$0.20	$0.24	$0.29	$0.31	$0.23	-$0.24	-$1.52	-$1.17	-$1.70	-$0.86	-$0.63	-$0.41	-$0.26	-$0.18	-$0.06	-$0.26	-$0.55	-$1.39	-$1.29	-$0.84	-$0.24	$0.10	$0.35	-$0.41

Observations – The Reid-Daviess outage, combined with the Coleman outage, had a significant impact on RT LMPs. Note that it appears, based on RT LMPs, that Coleman actually tripped offline HE9. Also, BREC scheduled the Reid-Daviess line to be out of service overnight. Did BREC actually intend to do so? **Scheduling an outage can impact DA LMPs, so should be done to reflect the intended outage period.**

Century ALUMINUM

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BREC OUTAGE INFORMATION AND CORRESPONDING MISO MARKET PRICES

10

Operating Day	10/23/2013

■ Denotes a planned outage, actual outage, or Hot Line Work

■ Denotes relevant market prices during outage events

Outages

	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24
REID : DAVIES Planned OOS	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
REID : DAVIES Planned HLW																								
REID : DAVIES Real-Time OOS												■	■	■	■	■	■	■	■	■	■	■		
Coleman Unit 1 Real-Time OOS																								
Coleman Unit 2 Real-Time OOS	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Coleman Unit 3 Real-Time OOS																								

Prices

Node	Market	Type	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24	Avg
BREC.CENTURY	DAH	Congestion	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	$43.19
		LMP	$58.00	$55.30	$55.20	$58.00	$61.00	$83.10	$137.40	$133.00	$111.00	$88.98	$101.37	$83.81	$77.00	$71.73	$70.00	$70.00	$68.00	$73.00	$81.88	$82.45	$73.00	$65.00	$60.00	$60.00	$78.83
		Loss	$0.25	$0.13	$0.10	-$0.11	-$0.13	-$0.14	-$1.01	-$1.58	-$1.40	-$1.77	-$1.80	-$1.80	-$1.45	-$0.16	-$0.11	$0.32	$0.01	-$0.10	-$1.00	-$0.79	-$0.85	$0.28	$0.43	$0.38	-$0.53
	RTH	Congestion	$0.38	$0.02	$0.08	$0.24	$0.28	-$0.23	-$4.28	-$5.81	-$4.43	■	■	■	■	■	■	■	■	■	■	■	■	■	$5.50	$1.17	$486.91
		LMP	$24.27	$23.33	$22.98	$24.88	$24.23	$31.91	$31.94	$33.98	$38.33	$348.80	$1,296.84	$822.31	$1,140.38	$1,083.41	$855.83	$488.57	$588.17	$537.31	$1,465.27	$1,616.48	$1,057.97	$836.82	$85.85	$28.86	$507.88
		Loss	$0.16	$0.22	$0.28	$0.35	$0.32	$0.29	-$0.58	-$1.44	-$1.33	-$0.95	-$1.05	-$0.84	-$0.58	-$0.48	-$0.35	-$0.31	-$0.38	-$0.83	-$1.83	-$1.38	-$0.85	-$0.24	$0.28	$0.34	-$0.48
BREC.BREC	DAH	Congestion	$5.77	$5.02	$5.22	$5.93	$8.03	$7.43	$14.32	$7.95	$2.45	$0.88	$2.17	$1.18	$2.58	$2.24	$3.30	$3.85	$3.29	$1.53	$0.73	$3.10	-$0.28	$2.03	$5.18	$5.95	$4.88
		LMP	$28.98	$28.38	$28.37	$30.21	$31.01	$43.86	$84.33	$58.48	$40.21	$46.12	$45.28	$41.79	$38.38	$37.52	$38.47	$35.48	$35.50	$40.18	$51.91	$47.53	$40.35	$35.58	$31.88	$30.98	$40.83
		Loss	-$0.08	-$0.23	-$0.25	-$0.38	-$0.41	-$0.52	-$2.41	-$2.07	-$1.91	-$2.18	-$2.08	-$1.97	-$1.78	-$0.75	-$0.88	-$0.27	-$0.50	-$1.52	-$1.44	-$1.22	-$0.91	-$0.81	-$0.08	$0.02	-$1.02
	RTH	Congestion	$0.24	$0.08	$0.04	$0.24	$0.21	-$0.57	-$4.51	-$5.88	-$4.84	$84.23	$288.24	$173.50	$203.14	$186.08	$110.87	$78.57	$87.30	$86.24	$248.38	$278.98	$197.08	$105.95	$3.67	$0.74	$87.88
		LMP	$23.88	$22.98	$22.88	$24.57	$23.87	$31.15	$31.18	$33.01	$35.47	$88.92	$312.47	$215.17	$247.33	$235.82	$151.13	$118.18	$137.43	$134.11	$331.97	$340.21	$253.78	$165.37	$63.25	$25.91	$128.78
		Loss	-$0.14	-$0.08	-$0.02	$0.03	$0.01	-$0.13	-$1.05	-$2.08	-$1.98	-$1.58	-$1.78	-$1.48	-$1.28	-$1.15	-$0.90	-$0.88	-$0.92	-$1.28	-$2.88	-$2.24	-$1.48	-$0.83	-$0.48	-$0.07	-$1.02
INDIANA.HUB	DAH	Congestion	$0.34	$0.42	$0.58	$0.81	$0.88	$1.84	$0.92	-$3.20	-$2.00	-$4.92	-$4.79	-$3.01	-$2.05	-$2.37	-$1.32	-$1.67	-$2.08	-$0.36	-$2.20	-$3.54	-$2.94	-$1.55	$0.58	$1.11	-$1.28
		LMP	$24.82	$25.45	$25.18	$25.82	$28.33	$38.31	$52.85	$48.82	$45.94	$41.91	$38.81	$38.83	$36.03	$33.47	$32.85	$38.48	$31.29	$38.48	$50.00	$42.11	$38.48	$32.84	$27.78	$38.48	$36.83
		Loss	$0.28	$0.48	$0.22	$0.14	$0.25	$0.32	-$0.08	-$0.79	-$0.73	-$0.58	-$0.58	-$0.54	-$0.90	-$0.19	$0.31	$0.22	$0.64	-$0.32	-$0.12	$0.00	-$0.12	$0.05	$0.32	$0.38	-$0.07
	RTH	Congestion	$2.51	$0.43	$1.10	$1.48	$0.67	$0.40	-$4.13	-$5.85	-$4.38	-$7.71	-$21.27	-$14.90	-$16.11	-$16.71	-$11.97	-$11.70	-$13.38	-$13.27	-$33.94	-$31.91	-$21.00	-$7.48	$18.32	$4.30	-$8.98
		LMP	$26.85	$23.80	$24.18	$28.29	$24.88	$32.94	$32.62	$24.71	$37.23	$29.37	$23.53	$38.18	$29.38	$34.38	$29.35	$27.98	$27.82	$38.88	$50.78	$38.81	$38.85	$53.04	$80.38	$30.05	$34.38
		Loss	$0.38	$0.38	$0.44	$0.52	$0.55	$0.88	$0.04	-$0.85	-$0.47	-$0.17	-$0.19	-$0.07	$0.11	$0.18	$0.16	$0.22	$0.24	$0.10	-$0.70	-$0.58	-$0.25	$0.28	$1.62	$0.50	$0.11

Observations – BREC continued to schedule the Reid-Daviess line outage through 10/26, and actually took the outage on 10/23, even though Coleman was also in outage. This significantly impacted both DA and RT LMPs. **Scheduling an outage can impact DA LMPs, so should be done to reflect the intended outage period.**

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BREC OUTAGE INFORMATION AND CORRESPONDING MISO MARKET PRICES

12

Operating Day 10/24/2013

Denotes a planned outage, actual outage, or Hot Line Work

Denotes relevant market prices during outage events

Outages

	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24
REID : DAVIES Planned OOS																								
REID : DAVIES Planned HLW																								
REID : DAVIES Real-Time OOS																								
Coleman Unit 1 Real-Time OOS																								
Coleman Unit 2 Real-Time OOS																								
Coleman Unit 3 Real-Time OOS																								

Prices

Node	Market	Type	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24	Avg
BREC.CENTURY	DAH	Congestion																						$5.50	$4.11	$0.33	$101.57
		LMP	$38.00	$35.37	$35.52	$38.21	$38.05	$58.00	$88.13	$98.00	$298.00	$298.00	$300.00	$300.00	$298.00	$298.00	$298.00	$298.00	$115.78	$105.02	$85.27	$58.03	$48.55	$40.38	$33.60	$28.48	$138.41
		Loss	$0.03	$0.40	$0.41	$0.41	$0.71	$0.21	-$0.12	-$1.42	-$1.35	-$1.08	-$0.80	-$0.73	-$0.93	-$0.57	-$0.54	-$0.73	-$0.70	$0.08	-$1.03	-$1.51	-$1.98	-$1.13	-$0.67	$0.48	-$0.47
	RTH	Congestion	$2.47	$0.40	$0.40	$1.72	$2.51	-$0.67	-$3.72											-$17.24	-$8.25	-$5.75	$0.58	$0.16	-$1.88	-$1.29	-$2.54
		LMP	$41.77	$24.38	$22.48	$31.85	$38.08	$55.52	$81.98	$97.55	$29.38	$58.58	$35.88	$33.38	$30.73	$30.91	$28.08	$30.24	$31.43	$48.85	$48.30	$98.15	$41.35	$28.35	$35.42	$28.58	$42.48
		Loss	$0.42	$0.45	$0.38	$0.50	$0.47	$0.01	-$0.58	-$1.24	-$0.30	-$0.64	-$0.88	-$0.80	-$0.35	-$0.51	-$0.30	-$0.31	-$0.40	-$1.18	-$1.51	-$3.40	-$1.08	-$0.48	-$0.08	$0.17	-$0.44
BREC.BREC	DAH	Congestion	$3.98	$3.28	$3.38	$3.48	$3.08	$0.78	$8.03	$8.07	$43.58	$42.70	$44.34	$45.40	$45.65	$48.58	$40.04	$48.08	$17.45	$17.08	$10.58	$7.28	$8.28	$7.05	-$0.55	-$0.08	$18.77
		LMP	$28.47	$25.57	$25.35	$25.01	$27.31	$38.14	$55.79	$58.48	$91.12	$88.05	$88.38	$88.48	$84.04	$83.67	$83.64	$81.37	$48.08	$58.31	$71.90	$54.58	$50.29	$41.57	$27.98	$25.83	$58.19
		Loss	$0.28	$0.38	$0.22	$0.21	$0.58	$0.05	-$0.58	-$1.88	-$1.77	-$1.50	-$1.21	-$1.13	-$1.28	-$1.28	-$1.21	-$1.08	-$1.05	-$1.22	-$1.48	-$2.01	-$2.45	-$1.47	-$0.42	$0.19	-$0.88
	RTH	Congestion	$1.73	$1.08	$0.94	$2.72	$3.83	-$1.33	-$4.74	-$1.38	-$0.48	-$0.11	-$3.25	-$4.12	-$3.51	-$12.97	-$5.98	-$4.18	-$3.77	-$18.31	-$7.24	-$8.47	$0.25	$0.08	-$1.88	-$1.31	-$2.98
		LMP	$40.54	$24.08	$22.08	$32.51	$37.81	$54.22	$88.21	$94.08	$28.78	$57.53	$34.51	$31.93	$28.85	$37.45	$27.85	$28.48	$31.10	$46.58	$48.52	$98.04	$40.54	$27.94	$34.93	$28.24	$41.43
		Loss	-$0.08	$0.18	$0.13	$0.18	$0.07	-$0.03	-$1.31	-$2.42	-$0.85	-$1.48	-$1.28	-$1.11	-$0.83	-$1.24	-$0.82	-$0.82	-$0.95	-$2.20	-$2.30	-$4.80	-$1.50	-$0.83	-$0.53	-$0.17	-$1.83
INDIANA.HUB	DAH	Congestion	$2.28	$2.42	$2.55	$2.08	$2.03	$3.48	$1.43	-$1.34	-$3.48	-$3.34	-$2.50	-$2.08	-$2.82	-$3.27	-$3.29	-$3.13	-$2.30	-$2.74	-$4.18	-$8.17	-$4.27	-$3.14	-$1.08	$0.03	-$1.38
		LMP	$24.88	$25.08	$24.98	$25.12	$28.58	$38.43	$50.04	$48.41	$45.12	$43.65	$43.78	$41.50	$37.05	$36.28	$33.08	$30.84	$30.58	$37.54	$48.58	$43.19	$38.12	$32.34	$27.88	$28.02	$35.91
		Loss	$0.43	$0.08	$0.08	$0.08	$0.98	$0.08	$0.30	-$0.73	-$0.68	-$0.48	$0.00	$0.08	-$0.40	$0.18	$0.17	-$0.38	-$0.38	-$0.17	-$0.13	-$0.38	-$1.08	-$0.51	-$0.02	$0.29	-$0.02
	RTH	Congestion	$13.98	$2.61	$3.08	$8.82	$8.81	$0.25	-$3.34	$1.35	-$0.15	$2.05	$0.83	$1.02	-$1.55	-$1.03	-$4.04	-$2.63	-$1.72	$1.13	$1.41	-$5.51	$0.74	$0.21	-$1.83	-$1.27	$0.78
		LMP	$53.75	$28.67	$25.24	$37.23	$41.38	$57.18	$83.58	$108.45	$29.98	$81.88	$38.98	$38.33	$33.04	$51.37	$38.48	$32.21	$34.43	$88.53	$57.21	$108.38	$42.25	$28.78	$35.78	$28.80	$48.57
		Loss	$0.88	$0.64	$0.58	$0.78	$0.88	$1.38	$0.02	$0.61	$0.22	$0.55	$0.13	$0.15	$0.40	$0.75	$0.45	$0.37	$0.33	$0.33	-$0.27	-$1.41	-$0.28	-$0.11	$0.23	$0.35	$0.38

Observations – Though BREC finally decided not to take the Reid-Daviess line out of service, they still left it in the planned outage report, which significantly impacted DA LMPs. **Scheduling an outage can impact DA LMPs, so should be done to reflect the intended outage period.** Note that BREC elected to schedule Hot Line Work instead of an outage, which resulted in no detrimental impact on RT LMPs.

Century ALUMINUM

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BREC OUTAGE INFORMATION AND CORRESPONDING MISO MARKET PRICES

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Operating Day	10/25/2013

Denotes a planned outage, actual outage, or Hot Line Work

Denotes relevant market prices during outage events

Outages

	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24
REID : DAVIES Planned OOS																								
REID : DAVIES Planned HLW																								
REID : DAVIES Real-Time OOS																								
Coleman Unit 1 Real-Time OOS																								
Coleman Unit 2 Real-Time OOS																								
Coleman Unit 3 Real-Time OOS																								

Prices

Node	Market	Type	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24	Avg
BREC.CENTURY	DAH	Congestion	$4.14	$3.21	$3.40	$4.17	$4.19	$5.29	$5.44	$4.71	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	$0.82	$3.18	$4.58	$34.91
		LMP	$30.00	$26.75	$28.73	$26.17	$32.00	$45.00	$80.25	$81.53	$113.00	$120.84	$136.75	$125.78	$122.00	$121.53	$119.43	$118.98	$87.77	$52.58	$63.00	$57.40	$52.98	$29.39	$26.97	$24.90	$68.54
		Loss	-$0.15	$0.18	$0.25	$0.24	-$0.11	-$0.17	-$1.22	-$0.88	-$0.31	-$1.22	-$0.92	-$0.15	-$1.17	$0.51	$0.82	-$0.01	-$0.01	$0.07	-$0.50	-$0.38	-$0.15	$0.00	$0.22	$0.23	-$0.17
	RTH	Congestion	$2.14	$0.00	$0.78	$4.53	$13.13	$23.63	$4.30	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-$3.00	-$5.75	-$1.95	$14.27	-$0.38	$3.85	-$0.32	-$0.54
		LMP	$26.45	$26.58	$26.44	$30.60	$43.90	$61.00	$48.42	$38.37	$47.80	$33.27	$29.08	$28.68	$29.88	$27.91	$25.67	$26.47	$26.82	$25.84	$27.11	$23.42	$41.64	$25.58	$27.98	$20.98	$31.42
		Loss	$0.47	$0.88	$0.74	$0.87	$1.03	$1.01	$0.57	-$0.02	$0.10	$0.08	$0.04	$0.19	$0.58	$0.56	$0.54	$0.81	$0.63	$0.81	$0.57	$0.83	$1.01	$0.91	$0.95	$0.93	$0.88
BREC.BREC	DAH	Congestion	$1.21	$1.30	$1.41	$2.07	$2.40	$0.82	$8.61	$7.40	$14.78	$13.28	$17.22	$15.25	$15.98	$15.58	$15.53	$16.17	$8.28	$3.88	$8.55	$4.42	$4.35	$0.80	$3.01	$4.88	$7.79
		LMP	$28.82	$26.57	$28.35	$28.78	$29.92	$40.29	$82.86	$83.83	$81.97	$57.05	$57.88	$54.38	$51.11	$50.91	$48.31	$46.25	$37.94	$38.93	$50.48	$41.38	$38.33	$28.88	$28.55	$24.90	$42.43
		Loss	-$0.40	-$0.08	-$0.05	-$0.05	-$0.40	-$0.80	-$1.78	-$1.38	-$0.82	-$1.02	-$1.30	-$0.58	-$1.44	-$0.17	$0.22	-$0.31	-$0.38	$0.23	-$1.08	-$0.83	-$0.48	-$0.28	-$0.03	$0.11	-$0.58
	RTH	Congestion	$0.12	$0.88	$0.76	$0.17	$22.41	$82.77	$22.01	-$7.54	-$7.24	-$7.88	-$11.18	-$8.35	-$7.32	-$6.50	-$8.38	-$3.33	-$3.12	-$3.04	-$5.78	-$1.70	$34.38	$0.82	$11.88	$0.71	$3.58
		LMP	$26.12	$26.28	$26.14	$33.93	$52.82	$98.71	$83.80	$26.78	$46.12	$32.44	$28.30	$28.15	$29.25	$27.38	$24.88	$26.11	$26.42	$26.40	$28.08	$23.42	$81.48	$26.50	$35.56	$21.78	$36.13
		Loss	$0.18	$0.35	$0.45	$0.57	$0.67	$0.57	$0.03	-$0.51	-$0.58	-$0.44	-$0.51	-$0.29	$0.08	$0.12	$0.18	$0.29	$0.29	$0.29	$0.18	$0.58	$0.73	$0.88	$0.72	$0.72	$0.22
INDIANA.HUB	DAH	Congestion	$0.80	$1.01	$1.08	$1.51	$3.11	$3.88	$3.98	$2.35	$1.45	$2.10	$1.55	$0.95	$1.23	$0.58	$0.18	-$0.38	-$0.11	$0.80	$1.93	$0.52	$0.88	$1.17	$3.29	$4.54	$1.58
		LMP	$26.78	$28.72	$26.54	$26.77	$31.29	$44.80	$58.97	$80.08	$50.15	$46.88	$42.88	$41.01	$37.58	$38.72	$33.62	$30.52	$30.40	$38.58	$45.34	$38.80	$35.77	$30.25	$27.42	$25.07	$37.13
		Loss	$0.18	$0.35	$0.49	$0.50	$0.26	$0.44	-$0.04	$0.04	$0.67	-$0.02	-$0.43	$0.35	-$0.24	$0.84	$0.88	$0.52	$0.53	$0.94	$0.41	$0.51	$0.53	$0.51	$0.58	$0.42	$0.38
	RTH	Congestion	$0.30	$1.37	$1.40	$1.78	$1.82	-$0.67	-$8.78	-$7.37	-$8.18	-$8.53	-$10.78	-$8.02	-$8.48	-$6.85	-$8.32	-$2.58	-$2.94	-$2.98	-$5.71	-$1.95	$1.78	-$1.14	-$1.12	-$8.44	-$3.14
		LMP	$26.70	$27.35	$28.10	$27.90	$32.71	$37.00	$35.86	$31.02	$48.74	$34.75	$29.90	$27.45	$31.04	$28.88	$28.42	$28.44	$27.19	$28.11	$27.44	$23.50	$29.25	$24.92	$23.05	$20.85	$29.11
		Loss	$0.57	$0.72	$0.77	$0.82	$1.14	$1.30	$1.07	$0.58	$0.98	$0.73	$0.88	$0.70	$1.04	$0.97	$0.88	$0.84	$0.88	$0.84	$0.87	$0.91	$1.12	$1.04	$1.00	$0.85	$0.88

Observations – Though BREC did not to take the Reid-Daviess line out of service, they still left it in the planned outage report, which significantly impacted DA LMPs. **Scheduling an outage can impact DA LMPs, so should be done to reflect the intended outage period.** Note that BREC elected to schedule Hot Line Work instead of an outage, which resulted in no detrimental impact on RT LMPs.

CenturyALUMINUM

KEC

BREC OUTAGE INFORMATION AND CORRESPONDING MISO MARKET PRICES

14

Operating Day 10/26/2013

■ Denotes a planned outage, actual outage, or Hot Line Work

■ Denotes relevant market prices during outage events

Outages

	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24
REID : DAVIES Planned OOS	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
REID : DAVIES Planned HLW																								
REID : DAVIES Real-Time OOS								■	■	■	■	■	■	■	■	■								
Coleman Unit 1 Real-Time OOS																								
Coleman Unit 2 Real-Time OOS	■	■	■	■	■																			
Coleman Unit 2 Real-Time OOS																								

Prices

Node	Market	Type	HE 1	HE 2	HE 3	HE 4	HE 5	HE 6	HE 7	HE 8	HE 9	HE 10	HE 11	HE 12	HE 13	HE 14	HE 15	HE 16	HE 17	HE 18	HE 19	HE 20	HE 21	HE 22	HE 23	HE 24	Avg
BREC.CENTURY	DAH	Congestion																		$0.00	-$3.70	-$8.22	-$4.11	-$3.12	-$1.58	-$1.20	$0.00
		LMP	$25.94	$24.50	$23.95	$23.91	$25.95	$28.20	$33.14	$38.00	$82.90	$84.58	$83.98	$58.08	$54.58	$52.00	$47.01	$46.50	$37.00	$38.00	$46.03	$38.08	$35.37	$30.07	$27.42	$28.18	$38.00
		Loss	$0.74	$0.01	$0.59	$0.70	$0.74	$0.24	$0.39	$0.28	$0.30	$0.32	$0.01	$0.10	$0.22	$1.14	$0.34	$0.43	$0.41	$0.39	$0.14	$0.07	-$0.15	-$0.21	-$0.08	$0.79	$0.40
	RTH	Congestion	-$3.47	-$4.08	$1.84	$2.41	$0.10	-$1.10	-$1.84										$0.34	$0.40	-$3.48	-$2.34	$0.22	-$0.08	$0.08	$0.07	-$0.22
		LMP	$20.74	$21.14	$25.03	$24.72	$25.42	$23.19	$24.58	$28.08	$46.38	$28.37	$24.81	$24.34	$24.40	$23.32	$23.71	$32.40	$24.28	$28.05	$27.38	$25.51	$31.24	$25.88	$25.08	$28.77	$26.40
		Loss	$1.10	$1.15	$1.05	$0.88	$1.08	$1.01	$1.02	$1.10	$0.88	$0.77	$0.82	$0.75	$0.73	$0.72	$0.77	$0.02	$0.54	$0.29	-$0.59	-$0.08	-$0.38	-$0.12	$0.12	$0.28	$0.50
BREC.BREC	DAH	Congestion	$7.25	$6.88	$6.46	$6.24	$7.27	$5.80	$4.73	$4.47	$7.97	$5.37	$3.02	$1.77	$1.73	$1.47	$1.31	$1.09	-$0.76	-$2.43	-$2.82	-$6.94	-$4.83	-$3.54	-$1.88	-$1.40	$2.01
		LMP	$28.82	$25.28	$24.76	$24.74	$27.18	$28.94	$33.53	$35.08	$42.00	$40.95	$38.38	$32.57	$31.21	$30.32	$28.76	$28.79	$28.63	$34.43	$40.01	$38.53	$34.48	$29.22	$28.75	$25.82	$31.62
		Loss	$0.48	$0.33	$0.32	$0.43	$0.45	$0.09	$0.12	-$0.08	-$0.08	-$0.08	$0.08	-$0.25	-$0.05	$0.05	-$0.03	$0.11	-$0.08	-$0.07	-$0.76	-$0.16	-$0.54	-$0.64	-$0.43	$0.43	-$0.02
	RTH	Congestion	-$2.10	-$2.18	$3.19	$4.38	$2.88	-$0.02	-$1.64	$0.28	$40.48	-$1.27	-$3.94	-$4.08	-$3.58	-$3.05	-$2.11	$0.02	$0.27	$0.19	-$3.51	-$2.38	$0.10	-$0.16	$0.03	$0.03	$1.53
		LMP	$21.88	$22.84	$28.17	$28.51	$27.82	$23.52	$24.52	$30.57	$78.22	$28.08	$24.76	$24.12	$24.23	$23.15	$23.74	$30.88	$23.98	$27.58	$27.11	$25.28	$30.88	$25.98	$25.42	$28.50	$28.01
		Loss	$0.88	$0.94	$0.85	$0.72	$0.91	$0.88	$0.84	$0.93	$0.70	$0.02	$0.67	$0.58	$0.55	$0.55	$0.58	$0.43	$0.33	$0.04	-$0.03	-$0.92	-$0.65	-$0.35	-$0.10	$0.04	$0.38
INDIANA.HUB	DAH	Congestion	$4.27	$4.23	$4.11	$3.88	$3.61	$1.71	$1.04	-$0.43	-$1.02	-$2.33	-$2.63	-$3.32	-$3.41	-$3.07	-$2.22	-$2.38	-$3.23	-$3.53	-$6.24	-$8.21	-$4.16	-$3.08	-$1.55	-$1.17	-$1.08
		LMP	$24.05	$23.05	$22.65	$22.58	$23.73	$25.13	$30.28	$30.98	$33.88	$34.17	$31.08	$28.08	$28.70	$28.18	$25.75	$25.93	$28.90	$33.88	$46.15	$37.91	$35.57	$30.52	$27.85	$28.03	$28.87
		Loss	$0.87	$0.55	$0.54	$0.63	$0.88	$0.45	$0.58	$0.72	$0.79	$0.83	$0.42	$0.33	$0.58	$0.45	$0.40	$0.70	$0.65	$0.46	$0.80	$0.40	$0.10	$0.21	$0.14	$0.61	$0.53
	RTH	Congestion	-$3.47	-$3.88	$0.77	$1.38	$0.02	-$1.32	-$1.91	-$0.40	-$2.08	-$0.88	-$4.12	-$4.16	-$3.88	-$3.11	-$2.40	$4.88	$0.16	$0.62	-$3.45	-$2.32	$0.31	-$0.02	$0.08	$0.12	-$1.22
		LMP	$20.74	$21.23	$23.98	$23.78	$25.44	$23.05	$24.58	$30.23	$27.40	$27.04	$24.93	$24.34	$24.41	$23.32	$23.88	$28.37	$24.18	$26.40	$27.78	$25.88	$31.71	$28.25	$25.93	$27.08	$25.62
		Loss	$1.10	$1.11	$1.05	$0.95	$1.18	$1.08	$1.18	$1.33	$1.08	$0.98	$1.01	$0.90	$0.84	$0.78	$0.83	$0.86	$0.63	$0.40	-$0.23	-$0.38	-$0.02	$0.19	$0.35	$0.52	$0.73

Observations – BREC scheduled the Reid-Daviess line to be out of service overnight. Scheduling an outage can impact DA LMPs, so should be done to reflect the intended outage period.

CenturyALUMINUM

KEC

CORRELATION BETWEEN PLANNED TRANSMISSION OUTAGES AND DA LMPs

15

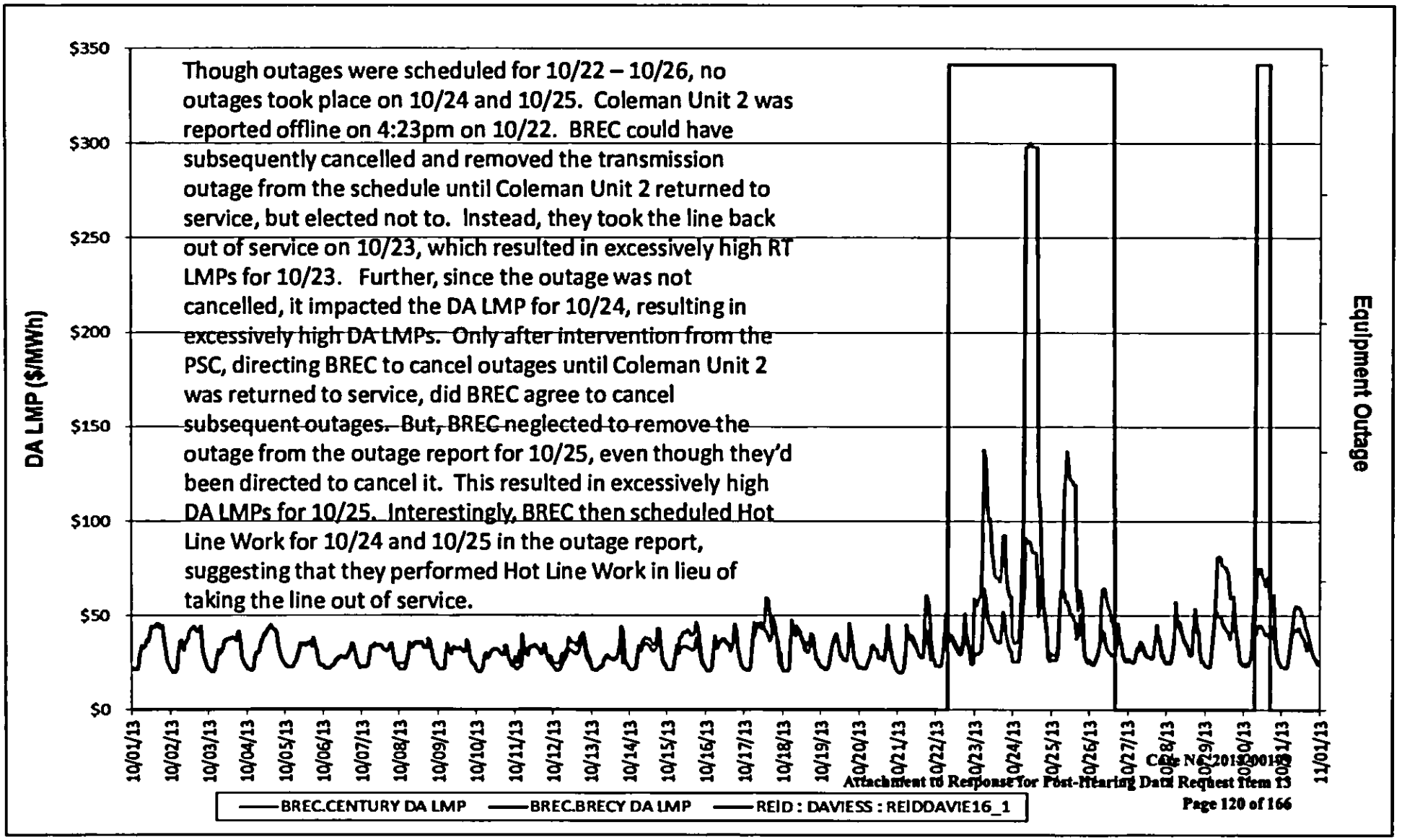


EXHIBIT A-6

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In The Matter Of:

APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR A GENERAL ADJUSTMENT OF RATES	)) CASE NO. 2012-00535)

DIRECT TESTIMONY

AND EXHIBITS

OF

LANE KOLLEN

ON BEHALF OF THE

KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.

J. KENNEDY AND ASSOCIATES, INC.
ROSWELL, GEORGIA

MAY 24, 2013

XI. THE COMMISSION SHOULD NOT ASSUME THAT THE RATE INCREASES ARE ONLY TEMPORARY BECAUSE THE COMPANY'S COAL-FIRED GENERATING UNITS WILL CONTINUE TO BE UNECONOMIC FOR THE FORESEEABLE FUTURE

Q. Are the Century, Alcan, and Reserve rate increases and the other related rate increases that will follow these only temporary?

A. No. These rate increases will be permanent unless and until the Company's power plants again are economic. The power plants will not be economic unless and until there are sustained and significant increases in market prices that are not offset by a contemporaneous increase in costs to Big Rivers, i.e., escalating coal prices or a future carbon tax affecting coal-fired generation. This is true regardless of whether the Company sells the energy output into MISO or sells the capacity and energy through one or more bilateral contracts. Market prices also will determine the ability of the Company to sell the power plants themselves at prices equal to or greater than net book value. In response to Staff 2-21(c), Big Rivers stated that its current Financial Model assumes that the Wilson plant will not be restarted until 2019, or six years from now.

Q. Does the Company acknowledge that the rate increases should not be considered temporary?

A. Yes. The Company prepared and provided to the Member cooperatives a "Rate Case Fact Sheet" dated December 14, 2012 in which it stated the following:

> It is Big Rivers' and its Members' plan to reduce expenses and replace system load, combined with an eventual recovery of prices in the wholesale power market, will enable Big Rivers to reduce its rates in the future. However, because we cannot know if and when and under what circumstances these favorable events will occur, Big Rivers cannot characterize its proposed rate increase as "temporary."

The Company provided a copy of this Rate Case Fact Sheet in response to AG 1-133. I have attached a copy of the relevant pages of the Company's response to AG1-133 as my Exhibit___(LK-4).

Q. Are market conditions likely to change in the short or medium term to provide a solution to Big Rivers' excess capacity and to reduce the effect on customers?

A. No. There is a low probability that market conditions will improve sufficiently and quickly enough to make a difference in this case, the Alcan increase case, or the other related future rate increases. Therefore, it would be unreasonable to set rates based on hopeful, but unfounded, speculation that market conditions will significantly improve for Big Rivers in the short or medium term. This is true for both regulatory and economic reasons.

First, raising rates temporarily to an unreasonable level in the hope that market conditions may improve and ultimately allow rates to decline back down to a reasonable level is not an option. My understanding is that rates set by the Commission must always be fair, just and reasonable under Kentucky law. Rates cannot be set at unreasonable levels, even temporarily. Moreover, it is bad public

policy to gamble on an improvement in market conditions that may or may not occur at some unknown time in the future. Rates should be set at reasonable levels based upon what is known when they are set, not based on speculation about future market conditions.

Second, the likelihood is very low in the near to intermediate term that the financial fortunes of Big Rivers will be turned around through an increase in the wholesale market price of energy, an increase in the value of coal-fired generation, moving out of MISO to PJM, entering into a long term purchase power agreement, finding a new wholesale distribution cooperative member willing to pay above market rates, or attracting a new end-use customer to locate on the system that is large enough to make a difference.

In its financial model, Big Rivers projects a very depressed wholesale energy prices through at least 2017. The Big Rivers forecast is confirmed by forward market prices reported for the MISO region. These energy prices for many months do not even cover Big Rivers' variable cost of production. And with the Smelters and their 850 mW load at a 98% load factor exiting the system, Big Rivers' variable costs of production will increase even higher, especially its fuel costs. The fact that it cannot even recover its variable costs in the market is one reason why the Company plans to idle Wilson and will be required to idle additional plants.

On April 5, 2013, MISO released the results of its first capacity auction under its recently enhanced resource adequacy construct. The system-wide clearing price

for the 2013-2014 planning year was $1.05 per mW-day. In other words, the Company's excess capacity has a market value of nearly $0, at least in the near-term. For comparative reference purposes, $1.05 per mW-day is equal to $0.32 per kW month, which is a mere 1.9% of the $16.95 per kW month proposed for the Rural class demand charge in this case.

In January 2013, SNL Energy released its Regional Reserve Margin Outlook for ISO New England, New York ISO, PJM, Electric Reliability Council of Texas, California ISO, Southwest Reserve Sharing Group, Northwest Power Pool, and MISO. MISO has a substantial capacity oversupply situation which is expected to last until late in the next decade. "SNL Energy's expected case for MISO sees surplus conditions of nearly 10,000 MW or more for the next few years, with at least 4,000 MW of excess from 2016-2020 (see Figure 8). After 2020, we expect the surplus to slowly decline due to demand growth." The market value of any excess generating capacity in MISO, especially coal fired capacity and its attendant environmental risk, is low and can be expected to stay low at least in the near to intermediate term. Therefore, selling a power plant is not likely to yield even net book value, let alone a significant economic gain for Big Rivers.

The low market value of coal generation was recently highlighted in two recent and well-publicized transactions. On March 31, 2013, the *Wall Street Journal* reported that three coal-fired power plants totaling 4,100 mW of capacity were sold in March by Dominion Resources to Energy Capital Partners at "just over $100" per

kW of capacity.[32] The article compared this sales price to Department of Energy estimates to build new coal-fired capacity "at about $3,000 per kilowatt."[33] The article also cited another sale in March of this year of 4,100 mW of capacity by Ameren to Dynegy for the assumption by Dynegy of $825 million in nonrecourse debt. The article stated that "Dynegy is getting paid $200 million to take the coal plants."[34]

Entering into a long term PPA, in lieu of selling the power plants, also is not likely to provide any relief. Such a PPA necessarily would be priced to reflect the depressed current market conditions and therefore would not likely provide full cost recovery. Further, because Big Rivers no longer is investment grade, the counterparty risk of doing business with it likely would put off potential purchasers.

An attempt to exit MISO and join PJM in the hopes of receiving more for capacity also is probably not a realistic or effective solution. First, there is an open issue as to whether adequate transmission capacity exists to do this.[35] Then there is the extended regulatory approval process that must be completed before this Commission and before the FERC. Finally, Big Rivers still would be responsible for its share of MTEP projects approved during its membership in MISO. An exit from

[32] "There is Life After Death for Coal Power," *The Wall Street Journal, available at* http://online.wsj.com/article/SB10001424127887323361804578390561956760382.html.

[33] *Id.*

[34] *Id.*

[35] In response to SC 1-4, in which the Sierra Club sought the Company's projections for capacity and energy prices in the PJM, the Company stated: "Big Rivers is a MISO participant and does not currently have transmission access to the PJM market."

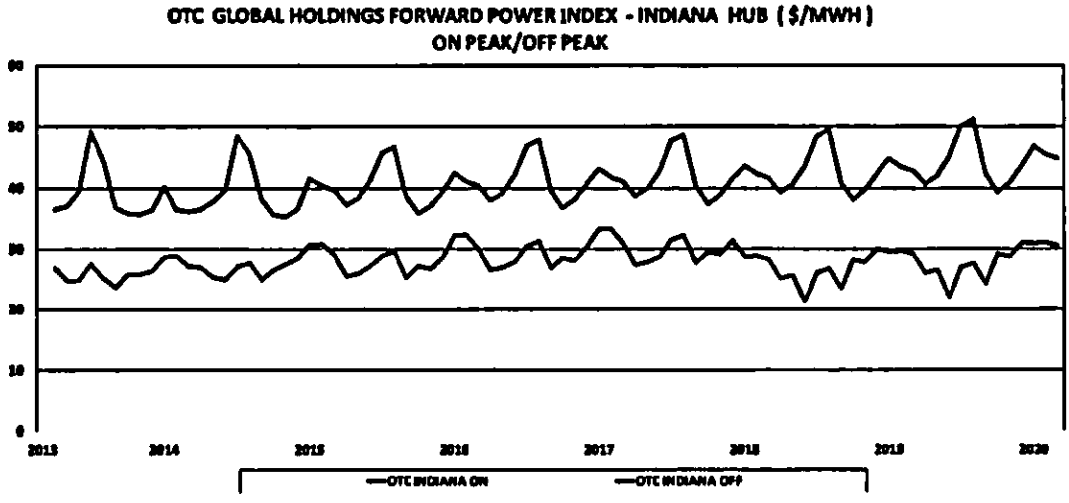
MISO undoubtedly would require a very large exit fee. If the Smelters are included in the MTEP cost responsibility calculation, then the exit fee would be even greater.

Hoping that a new distribution cooperative can be served at a wholesale rate above market assumes that the new customer will act irrationally. There is no basis to assume that a new wholesale customer willingly will pay more than market value for energy or capacity. In fact, the very reason that Big Rivers' costs are above market is the primary reason that the Smelters plan to exit the system. Moreover, in the case of TVA cooperatives, there is typically a five year notice provision in their contracts.

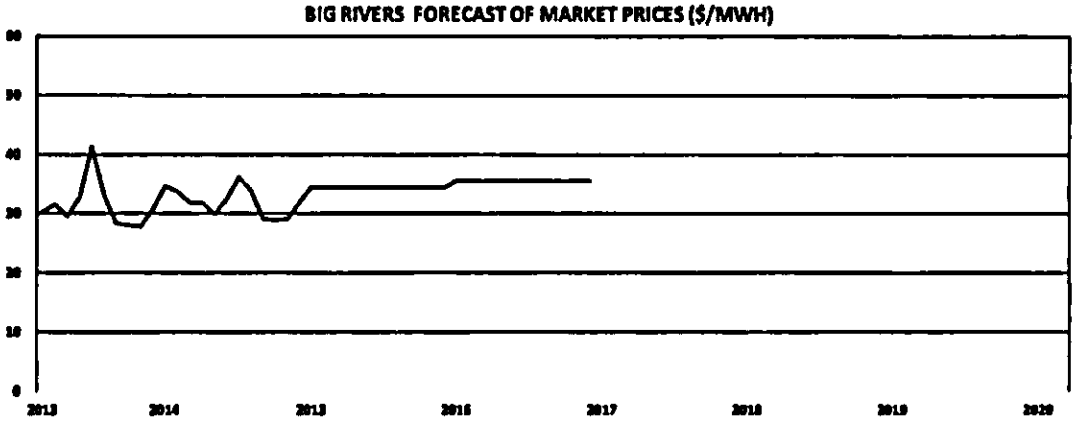
Holding out hope that a large energy intensive retail load may be incentivized to locate in the service territories of Kenergy, Meade County or Jackson Purchase is unfounded. Large loads desire rate certainty, which certainly is not the case here. Moreover, the Company's proposal to assign all responsibility for Big Rivers' excess capacity to the Rural and Large Industrial customers runs directly counter to any economic development goals. The best way to attract a new energy intensive load is to equitably balance the costs of excess capacity between the Company's customers and creditors. Minimizing rate increases through such balancing will promote economic development. Big Rivers' proposal to dramatically increase rates in this proceeding and the risk exposure to additional huge rate increases in subsequent proceedings will dampen and even kill economic development.

Q. Do available forward market prices indicate that the present depressed power market will recover in the next several years?

A. No. To the contrary, the evidence is that the present depressed power market will extend for at least the next several years. I show the MISO forwards at the Indiana hub in the following graph. These forward market prices demonstrate that the market does not expect rising prices for at least the next seven years.



The Company's own market price projections demonstrate that there is no market expectation of rising market prices for at least the next four years. I show the Company's projections of market prices used in its corporate financial model in the following graph.



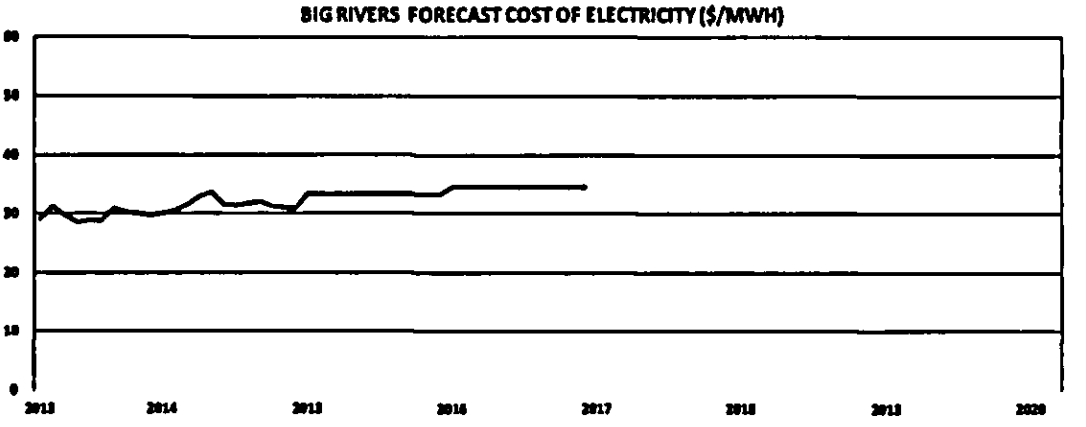
Q. How do these projected market prices compare to the Company's production costs?

A. The Company's production costs on an all-in basis are much greater than these projected market prices, which indicates that the power plants are uneconomic and will remain uneconomic on an all-in basis for at least the next seven years.

The Company's variable production costs also are greater than or only minimally less these market prices, or at least the off-peak market prices. This confirms that the excess capacity is uneconomic because in order to operate, the market price must exceed the variable cost to operate. The units cannot be cycled off and on, or even significantly up and down, between peak and off-peak hours.

The following graph shows the Company's projected variable production costs from the corporate financial model that it provided in response to Staff 2-36. I

should note that these projections are unrealistically low because they assumed that the Alcan load would continue through 2016 and that only the Wilson plant would be idled in response to the Century termination. However, in reality, the Company's variable production costs will increase when it loses the Alcan load and is required to layup additional power plants, which will result in a greater costs due to less efficient system operation and the greater heat rates of the remaining units.



XII. IF AN EQUITABLE SHARING WITH CREDITORS ULTIMATELY LEADS TO A RESTRUCTURING OF THE COMPANY AND ITS DEBTS, THAT PROCESS CAN BE BENEFICIAL TO CUSTOMERS

Q. Company witnesses Mr. Mark Bailey and Ms. Billie Richert state in their Direct Testimonies that if the Commission does not grant the full amount of the

Exhibit B

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Midcontinent Independent System Operator, Inc.	)	**Docket Nos. ER14-292-000**
	)	**ER14-294-000**
	)	**(not consolidated)**

AFFIDAVIT

OF

DONALD J. MORROW, P. E.
QUANTA TECHNOLOGY, LLC

ON BEHALF OF

CENTURY ALUMINUM OF KENTUCKY GENERAL PARTNERSHIP

November 22, 2013

AFFIDAVIT

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. In my role as Partner & SVP Corporate Strategy, I oversee the service offerings provided by Quanta Technology and manage the business development group in the company. I also continue to provide consulting services to clients, which focuses primarily on electric transmission in the area of system operations, system planning, and energy policy.

Q. Briefly describe your work history.

A. I have been in the industry for 31 years. Prior to my current position, I managed the Advisory Services Practice at Quanta Technology. The

Case No. 2013-00199
Attachment to Response for Post-Hearing Data Request Item 13
Page 132 of 166

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. I held this position when the Century Aluminum project commenced in June 2013. Previous to managing the Advisory Services Practice, I served as Vice President Transmission at Quanta Technology beginning in 2006. In that position, I focused on transmission analysis to support system operations, system economics, system planning and capital budgeting. I led projects in the development of transmission master plans, identifying strategic approaches for engaging construction contractors on transmission projects, implementing Electric Reliability Organization ("ERO") compliance programs, and establishing system restoration plans that were compliant with North American Electric Reliability Corporation ("NERC") standards. While in this role, I also created the NERC Standards Compliance practice at Quanta Technology. Prior to joining Quanta Technology, I served as Director of Operations at American Transmission Company ("ATC"), which is a for-profit, stand-alone transmission company in the Upper Midwest. In that role, I was responsible for the formation of the system operations department for the startup of ATC on January 1, 2001. This startup included the

setting up of two control centers that oversaw transmission system operations in Wisconsin, Iowa, and the upper peninsula of Michigan. Before I left ATC, I also served as Director of System Planning & Protection. Prior to my role at ATC, I served as Senior Director, Systems Operation for Madison Gas and Electric Company ("MGE"). In this role, I oversaw the distribution, transmission and generation operations for the company. From my time at MGE and ATC, I developed extensive transmission outage management experience. At both organizations, I oversaw the maintenance schedulers who worked with the engineering and field operations groups to schedule outages, develop outage plans, and define work clearance zones. I was also accountable for the training of the system operators in the tagging and clearance procedures to establish work zones and for the system operators' use of those procedures in the issuance of holdout tags for equipment during maintenance activities. At ATC, I was also responsible for creating the Emergency Response Plan for the organization to coordinate outage restoration activities during system emergencies. At MGE, I was responsible for updating the system restoration plan. At both organizations, I helped organize and conduct table-top and other emergency restoration drills.

Q. Describe your experiences with energized maintenance practices in transmission.

A. In 2003, while at ATC, staff under my direction evaluated the option to rebuild the 345 kV Paddock to Rockdale line using energized construction techniques. At Quanta Technology, I worked with Quanta Energized Services ("QES") to evaluate performing energized maintenance work on a 230 kV facility in Florida. I have also investigated cost recovery issues in regional energy markets.

Q. What is the purpose of your Affidavit?

A. I have been retained by Century Aluminum to address the use of live-line or energized transmission maintenance as part of a package of options that would constitute feasible alternatives to a System Support Resource ("SSR") arrangement for Big Rivers Electric Corporation ("BREC") Coleman Units 1, 2, and 3. This Affidavit demonstrates that live-line transmission maintenance can and should be used by BREC to help expedite the termination of the SSR Agreement with BREC for Coleman, and help ensure that firm transmission service to Century Aluminum's Hawesville, Kentucky smelter will not be curtailed going forward.

Q. Have you previously testified about this issue on behalf of Century Aluminum?

A. Yes, I presented Direct Testimony before the Kentucky Public Service Commission ("KPSC") in KPSC Case No. 2013-00221 to provide evidence that live-line transmission maintenance is consistent with

good and reasonable utility practice. In its Order issued August 14, 2013, the KPSC agreed that live-line transmission maintenance is consistent with good and reasonable utility practice, but the KPSC stopped short of ordering BREC to undertake live-line transmission maintenance.

1. Overview of Energized Transmission Maintenance

Q. What is meant by the term "energized transmission maintenance"?

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

Q. What voltages constitute transmission?

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

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

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

Q. Briefly describe bare hand techniques

A. Bare hand work is carried out on energized high and extra high-voltage lines with the line workers normally wearing conductive clothing. While performing the work, the line worker is in contact with the energized line while insulated from earth and other electrical potentials. The practice operates from the principle that a line worker can safely be in contact with an energized line, provided that the line worker is effectively insulated from all other objects that could be at a different voltage potential. The application of this method requires the use of conductive clothing and electrical insulating equipment to gain access to the energized conductor or fitting while maintaining adequate air clearance as insulation from other objects at different electrical potential. Bare hand energized maintenance can be ground-based, structure-based, helicopter-based, or scaffold-based. Ground-based energized maintenance means that access to the live equipment is provided from the ground using insulated equipment such as an insulating ladder, insulated elevated work platform, insulated boom truck, or insulated crane. Exhibit B-1 shows an example of ground-based bare hand techniques using a bucket truck to change spacers on

a 500 kV line. Exhibit B-2 shows a close up picture of bare hand techniques in a training exercise to repair damaged 345 kV conductor with a splice. Structure-based energized maintenance means that access to the live equipment is provided from the transmission tower or structure using insulated equipment such as an insulated ladder or ropes. Exhibit B-3 shows an example of structure-based bare hand techniques to change out insulators on a 345 kV line with H frame wood structures. Helicopter-based energized maintenance means that access to the live equipment is from the air using platforms extended from the frame of the helicopter. Helicopters are also used to insert workers onto energized equipment using ropes. Exhibit B-4 shows an example of a helicopter inserting a worker on energized transmission conductor. Scaffold-based energized maintenance is a specific type of ground-based energized maintenance, which provides access to the live equipment from an insulated scaffold that has been built to support the workers and their tools working on the live equipment. Exhibit B-5 shows an example of scaffold-based bare hand techniques to install and energize a new switch. The scaffolding-based approach is generally used for energized maintenance in substations. The structure-based and helicopter-based approaches are generally used for energized maintenance on overhead transmission lines. Ground-based

approaches (excluding insulated scaffolding) may be used for both overhead transmission lines and substations.

Q. Briefly describe hot stick techniques.

A. The hot stick method is based on the principle that the line worker shall always maintain a minimum approach distance from any energized high voltage line or equipment. In this case, the line worker stays at a different electrical potential than the energized equipment. Maintenance work performed on energized equipment uses tools and equipment that are fitted to insulating sticks. Hot stick energized maintenance can be ground-based, structure-based, or scaffold-based. Exhibit B-6 shows an example of ground based hot stick maintenance techniques to change insulators on a 115 kV line. Hot sticks are not used for helicopter-based energized maintenance.

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

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

Q. Briefly describe robotic techniques.

A. For this technique, robotic booms are used to connect to energized conductors and then move the conductor out of a work zone to maintain minimum accepted distances for energized or de-energized construction techniques. The robotic boom will have appropriately sized insulators attached to a boom that serves as a temporary structure. These booms may be mounted on a truck or may have an integral, motorized power system that can be controlled to move the energized conductor out of the work zone. Exhibit B-7 shows an example of robotic booms being used to move energized conductor to expand the work zone for de-energized maintenance to relocate a double circuit 240 kV lattice tower structure.

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

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

- Energized reconductoring
- Single to double circuit conversion
- Close proximity new conductor stringing
- Insulator replacement
- Spacer /dampener replacement
- Structure replacement

- Structure component replacement
- Sleeve /splice replacement
- Conductor maintenance
- Inspection
- Hot spot bypass
- Bus repair
- Wet and dry insulator washing
- Energized substation tie-in

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

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

Q. Do any of these limitations exist with respect to the facilities at issue with the Coleman SSR application?

A. I am not currently aware of any situation on these specific facilities that would restrict the use of one or more of these energized techniques. However, each maintenance type will require different methods. For example, a project focusing on tower replacement requires greater working clearances and access for heavier equipment than for a project that focuses on replacing bad insulators. Selection of

a specific maintenance approach will be based upon pre-maintenance work planning that should take into account issues such as easement access, ROW width, flight restrictions, noise ordinances, or other issues that impact the ability to deploy energized maintenance techniques.

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

A. Yes, the use of energized maintenance techniques, when the incremental cost is justified and when they are implemented by qualified, properly trained staff using well designed work practices and tools, can be considered both good utility practice and prudent utility practice provided the utility can recover its costs. These techniques are frequently used in the industry. Since 2010, Quanta Services companies have performed 52 energized projects for 18 industry participants in the USA, 10 industry participants in Canada and 1 utility in South Africa. Since 2010, the USA client list includes utilities such as AEP, XCEL, ONCOR, Kentucky Utilities, NSTAR, PG&E, Northeast Utilities, and others that are recognized industry leaders. In addition, Utilities Service Alliance,[1] has contracted with

[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.

Quanta Services to facilitate the provision of energized services at approximately 30 nuclear power plant substations owned and operated by 16 different companies. By performing certain maintenance activities energized, the plant operator is able to keep the nuclear generator on-line during these maintenance activities. Under this agreement, Quanta Services has performed over 50 energized maintenance projects in substations at these nuclear facilities.

2. Safety Record of Energized Maintenance Techniques

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

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

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

A. The safety record for energized maintenance and construction at QES compares very favorably with and, in fact, is superior to the industry safety record for all transmission maintenance (both energized and de-energized). Using information provided by our parent company, Quanta Services, the overall industry LTIR for transmission maintenance over the past 12 years has varied from a high of 3.4 in 2000 to a low of 1.1 in 2012. These industry LTIR values are available from OSHA data.

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

A. I am only able to address the Quanta Services training program. One of the main reasons for the exceptional safety record described above is the experience and training of Quanta Services staff. The core group of live-line advisers in QES has a combined total of more than 400 years of energized work experience, starting with the first North American energized reconductor project in 1990 – five miles of 161 kV transmission line in Canada. Their experience is the foundation of the Quanta Services-wide program of energized work procedures and training. The work procedures developed by QES are fully compliant with OSHA 1910.269, Electric Power Transmission and Distribution Work Practices, and many of them have been adopted by the National

Electrical Contractors Association ("NECA") and the International Brotherhood of Electrical Workers ("IBEW"). The prerequisite to qualify for Quanta Services' comprehensive program for bare-hand training and certification is journeyman lineman status, preferably with in-depth knowledge and experience in hot stick maintenance of transmission facilities. Each candidate is interviewed and thoroughly evaluated prior to acceptance in the program. Each candidate receives more than 120 hours of training, which includes class room and field projects to learn and evaluate the theory and practical use of tools on energized circuits. The QES in-house training staff has certified journeymen from Quanta Services' operating units throughout North America to perform live-line, bare-hand work, as well as lineman and operators for use of the robotic arms on distribution and transmission voltages. The Quanta Services' training program meets all accepted industry standards including the U.S. OSHA Safe Work Act (1910.269) and the Work Safe BC (Canada) requirements. The program has been accepted by the NECA Local Line Construction Chapters and IBEW. Since its inception, over 425 Quanta linemen have been certified.

3. <u>Need for Energized Maintenance As a Feasible Alternative to an SSR.</u>

Q. Describe the Century Aluminum request.

A. Century Aluminum will be installing a protective relay scheme to reduce load at the Hawesville Smelter for sudden loss of certain transmission lines near the Hawesville Smelter. I also understand that Century Aluminum has requested Big Rivers to commit to have maintenance performed on these lines using energized techniques in order to minimize outages, particularly sustained outages, of these lines.

Q. What is the purpose of this request?

A. Century Aluminum has made this request for live-line transmission maintenance to minimize the period during which Coleman is required as an SSR, and to ensure that BREC remains capable of providing firm transmission service to the Hawesville Smelter.

Q. How is a minimum level of reliability established?

A. Mandatory reliability standards are established by NERC. These standards must be followed by entities that own and operate equipment that comprises the North American BES and by entities that utilize the North American BES to serve load or trade electricity. In the United States, the Federal Energy Regulatory Commission ("FERC") has ultimate responsibility for approving and ensuring performance consistent with these standards. From an operational standpoint, minimum levels of reliability are primarily established through NERC's transmission operating procedure standards, which

are mandatory standards adopted by NERC and approved by FERC. This series of standards has the designation of "TOP" in the NERC numbering sequence. The TOP standards identify requirements for operating the system within limits, sharing data, establishing operational authority, and taking other actions necessary to ensure the reliable operation of the North American BES.

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

A. There are several standards that are applicable to this situation, but a closer look at two of these standards, TOP-004[2] and TOP-007,[3] is useful to highlight the issues in this case. TOP-004 states that the transmission operator shall operate within the Interconnection Reliability Operating Limits ("IROLs") and System Operating Limits ("SOLs"). It further requires that the transmission operator shall operate so that the most severe single contingency will not result in instability, uncontrolled separation, or cascading outages. It also requires that if the system enters an "unknown operating state," as referenced in TOP-004, the situation will be considered an emergency and the transmission operator should return the system to "proven reliable power system limits" within 30 minutes. TOP-007 requires

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

that when a contingency or other event results in an IROL violation, the transmission operator shall return the operation of its transmission system to within IROL limits as soon as possible, but no longer than 30 minutes. The BES is planned and designed so that in most conditions on the BES, the electric system will stay within established IROLs and SOLs while supporting a substantial number of economically driven transactions of electrical energy. Typically, wholesale purchases of electric energy are made of the lowest cost energy available and this energy is moved through the system while transmission operators are able to keep system voltage levels, thermal operating limits, and transmission corridor loadings at or below the established IROLs and SOLs. In a limited number of cases, however, there is not an ability to import the lowest cost energy and still stay within these limits.

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

A. A "contingency" is the loss of equipment from the electric system. An element is lost when it is no longer in an energized state and providing support for the BES. Elements include transmission lines, transformers, generators, buses and other similar equipment. Contingencies are also referred to as an "N-1" condition, where "N" represents the total number of all pieces of equipment on the system

and "N-1" represents the loss of any one of those items. When a contingency occurs, the rest of the electric system must support the electrical load and generation on the system in the absence of that equipment. For example, if a transmission line is lost, electricity shifts to other remaining lines on the system. If generation is lost, other generation must make up for the lost power and provide voltage support to maintain the integrity of the system, or load must be curtailed to restore the system to proven reliable power system limits. A single contingency is the loss of one piece of equipment. The most severe single contingency is the loss of the one specific piece of equipment that puts the most stress on the remaining equipment in the system. In the transmission line example, the electricity that shifts to other energized elements on the system may result in loadings that exceed the operating limits of the equipment. For this example, the loss of a specific transmission line that causes the greatest overload on any other transmission line would be considered the most severe single contingency. Contingencies can also impact the voltage of the system and the most severe single contingency could also negatively impact voltage levels. Regardless of the nature of the contingency, the system still should operate within equipment thermal limits and accepted system voltage levels after the contingency occurs. If such limits are identified as an IROL, then TOP-007 requires that

even under the most severe single contingency, the system operator must be able to return the system to within the established IROL. If such a situation results in an unknown operating state, then TOP-004 requires that even under the most severe single contingency, the system must be able to return to proven reliable power system limits within 30 minutes. In some cases, there may be a limited set of options to manage these overloads – such as either shedding load to reduce flows on the overloaded transmission lines or turning on a limited set of generators that have the ability to "push back" against these overloads and reduce the flows to within accepted limits. If the required unit is not able to be started and loaded as needed in sufficient time to address the overloads, and unless alternative arrangements or actions are not available to address the overload, then the unit will be designated as a must-run generator and kept on-line to support the system in case of specific contingencies.

Q. How are these situations impacted by maintenance activities?

A. Transmission maintenance is frequently performed de-energized. This results in taking equipment out of service and creating a clearance zone for the repair crews to perform the maintenance work. From a TOP-004 and TOP-007 perspective, this means that system operators must operate the system without this element during the maintenance activity, while ensuring that the BES stays within established IROLs

and SOLs. Further, with this element out of service, the system must be operated such that even under the most severe single ***NEXT*** contingency, the transmission operator must return the BES to within the established IROLs as soon as possible and no longer than 30 minutes. Because the starting point during the line outage is already an N-1 condition, the next contingency is effectively an N-1-1 state – the loss of two pieces of equipment on the system. During de-energized maintenance, must-run generation requirements may have to be increased or system load either shifted or curtailed to ensure that the system is operated such that it satisfies the TOP-004 and TOP-007 standards.

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

A. It is my understanding that, while Century Aluminum was purchasing electricity from Kenergy under its prior contract, Big Rivers, as the wholesale supplier to Kenergy, relied on Coleman to supply energy to Kenergy and, in turn, to Century. With the expiration of that contract, Coleman is not needed for energy and capacity. Accordingly, Big Rivers notified MISO that Big Rivers intended to suspend operation of Coleman. Big Rivers' notification triggered a MISO review to determine whether Coleman may be needed for reliability reasons and, thus, be designated as an SSR. MISO determined that, in the absence

of an agreed upon and implemented mitigation plan, Coleman still needs to be on-line to satisfy NERC TOP standards when Century Aluminum is operating the Hawesville Smelter at full load.

Q. How could the use of energized maintenance techniques alleviate the need for SSR status for Coleman and help ensure the availability of firm transmission service to the Hawesville Smelter?

A. The request to use energized maintenance techniques should be considered as part of a package of actions that constitute the mitigation plan that would alleviate the need for SSR status for Coleman. It is my understanding that the mitigation plan includes Century's installation of capacitors at the Hawesville Smelter, which has been completed; the establishment of a protective relay scheme to automatically reduce load at the Century Aluminum facility for loss of any of the three lines identified above, which is being approved by SERC Reliability Corporation's Dynamic Review Subcommittee; and the use of live-line maintenance techniques when maintenance is performed on those facilities. As part of the mitigation plan, live-line maintenance should be used, when possible, to avoid creating contingencies on the system that may require curtailment of the Century Aluminum load below desired production levels. The use of live-line transmission maintenance techniques will keep the

equipment fully operational during maintenance and would establish a more 'robust' operating point during system operations. In other words, with the use of live-line transmission maintenance, the operating state of the system is "N" and not "N-1" during the maintenance period. The effect, obviously, is that the next contingency would then be N-1 instead of N-1-1, which would reduce the instances of when curtailment of firm transmission service to the Hawesville Smelter may occur.

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

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

Q. Can you cite examples where live-line transmission maintenance has been approved by regional operators such as MISO?

A. Yes, there are two well publicized examples that involved regional operators in the decision to utilize energized maintenance techniques on major transmission maintenance projects. The first example is the 345 kV LaCygne to Stillwell project. This project was performed in 2003 and involved reconductoring the existing 345 kV LaCygne to Stillwell line while the line was energized. The need to do this project energized was created by the difficulty in getting Southwest Power Pool ("SPP") approval for an extended outage of the line to do the reconductoring due to extensive congestion in the area. Kansas City Power & Light ("KCPL") worked with SPP and its members to get agreement to perform the reconductoring energized and to recover the extra cost through cost-sharing by the SPP members. The project was completed ahead of schedule and without incident. The project was documented in an article in the September 2003 issue of Transmission and Distribution World magazine. The second example is the on-going project by AEP to reinforce the transmission grid to the Lower Rio Grande Valley in Texas. That portion of the system is served by two single-circuit 345 kV lines. Load growth and generation retirements have put strain on those lines and a plan was developed by AEP, which was approved by ERCOT to improve access into this portion of their system. Due to difficulties in scheduling outages for a needed reconductor that was part of that plan, ERCOT granted approval to

perform the reconductor energized. This project was documented in the May 2013 issue of Transmission and Distribution World magazine.

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

A. Yes. Rio Tinto Alcan's smelting operation in Kitimat, British Columbia uses live-line maintenance practices to maintain the transmission lines that feed their smelting facilities. Allteck Line Contractors, another Quanta Services company, provides energized maintenance for Rio Tinto through an arrangement that has been in place for about 5 years. During that time, Allteck has used live-line maintenance techniques safely and successfully for replacing damaged insulators on those lines.

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

A. The objections to energized maintenance practices are usually concerns over safety and uncertainty on cost recovery of the extra expense. With respect to safety, those concerns are addressed by engaging highly qualified, well trained, experienced contractors that understand the technical aspects of energized projects and have developed detailed work practices and acquired appropriate, well maintained tools to address the working conditions on energized equipment. With respect to cost recovery, it may be a legitimate concern. Energized

maintenance techniques are typically more expensive than de-energized techniques. The beneficiaries of energized construction are users of the electric system and market participants who would avoid having to pay congestion costs related to constraints created during maintenance outages. However, in today's markets, there is no clearly established method to align the extra cost of energized maintenance with those who benefit from it. While certain project exceptions exist,[4] usually the extra cost burden falls on the transmission owner. In such cases, the transmission owner will often make the economic decision to use the practice that minimizes the costs to the transmission owner – even if the incremental cost of performing the work energized is substantially less than the energy cost savings in the impacted energy market that would have resulted from performing the work energized. It is my opinion that once cost allocation methods recognize the value of energized maintenance practices in reducing congestion in energy markets, then energized maintenance techniques will become more widely utilized than they are today.

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

A. Based upon my current understanding of the situation, neither of these concerns would apply to the Century Aluminum situation. I

[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.

understand, based on information provided by BREC during the KPSC proceeding, that BREC already has in place at least one contract with a vendor that has experience performing energized transmission maintenance. If BREC uses experienced contractors with well-trained staff in energized work practices who use appropriate, well-maintained tools and have energized project experience, BREC will have acted prudently to address safety concerns. Also, Century Aluminum has represented to BREC that Century Aluminum will cover the extra cost of performing maintenance energized versus de-energized. And, although I am not an attorney, I understand that contractual arrangements are also in place that would require Century Aluminum to indemnify and hold harmless BREC against any liability in the performance of energized transmission maintenance. Mr. Early explains these arrangements in his Affidavit. Therefore, there should be no safety, cost recovery, or liability issues presented by requiring BREC to perform energized transmission maintenance as a feasible alternative to a Coleman SSR arrangement and as a means of helping to ensure that firm transmission service to Century Aluminum's Hawesville Smelter is not curtailed.

Q. Does this conclude your affidavit?

A. Yes.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

	)	Docket No. ER14-292-000
Midcontinent Independent System Operator, Inc.	)	Docket No. ER14-294-000
	)	(not consolidated)

VERIFICATION

I, Donald J. Morrow, am submitting this affidavit in the above-captioned proceeding for Century Aluminum of Kentucky General Partnership. I submit this verification to verify that the Affidavit of Donald J. Morrow was prepared by me and/or with the assistance of others working under my direction and supervision, and that the contents are true to the best of my knowledge, information, and belief.

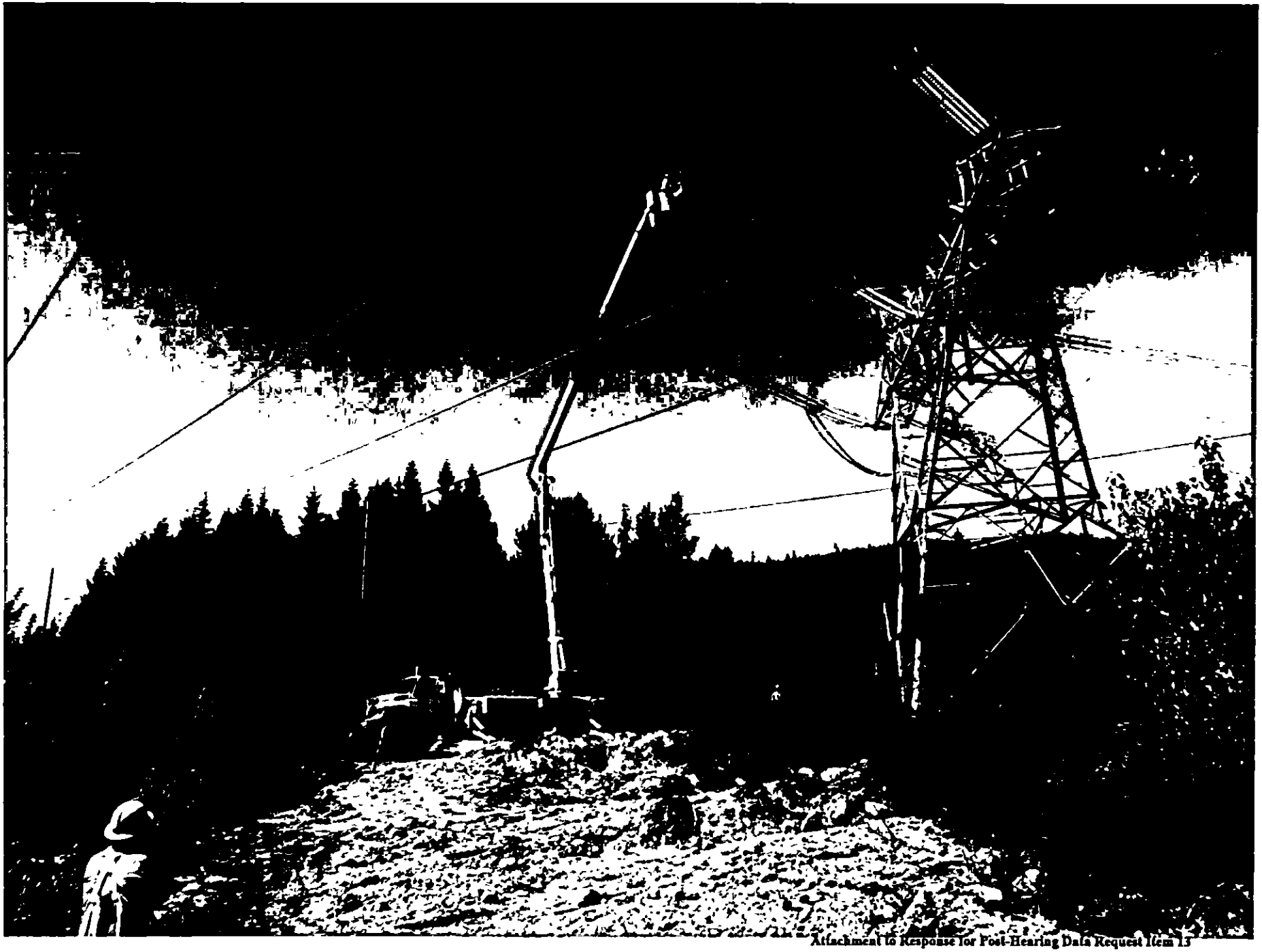
Donald J. Morrow

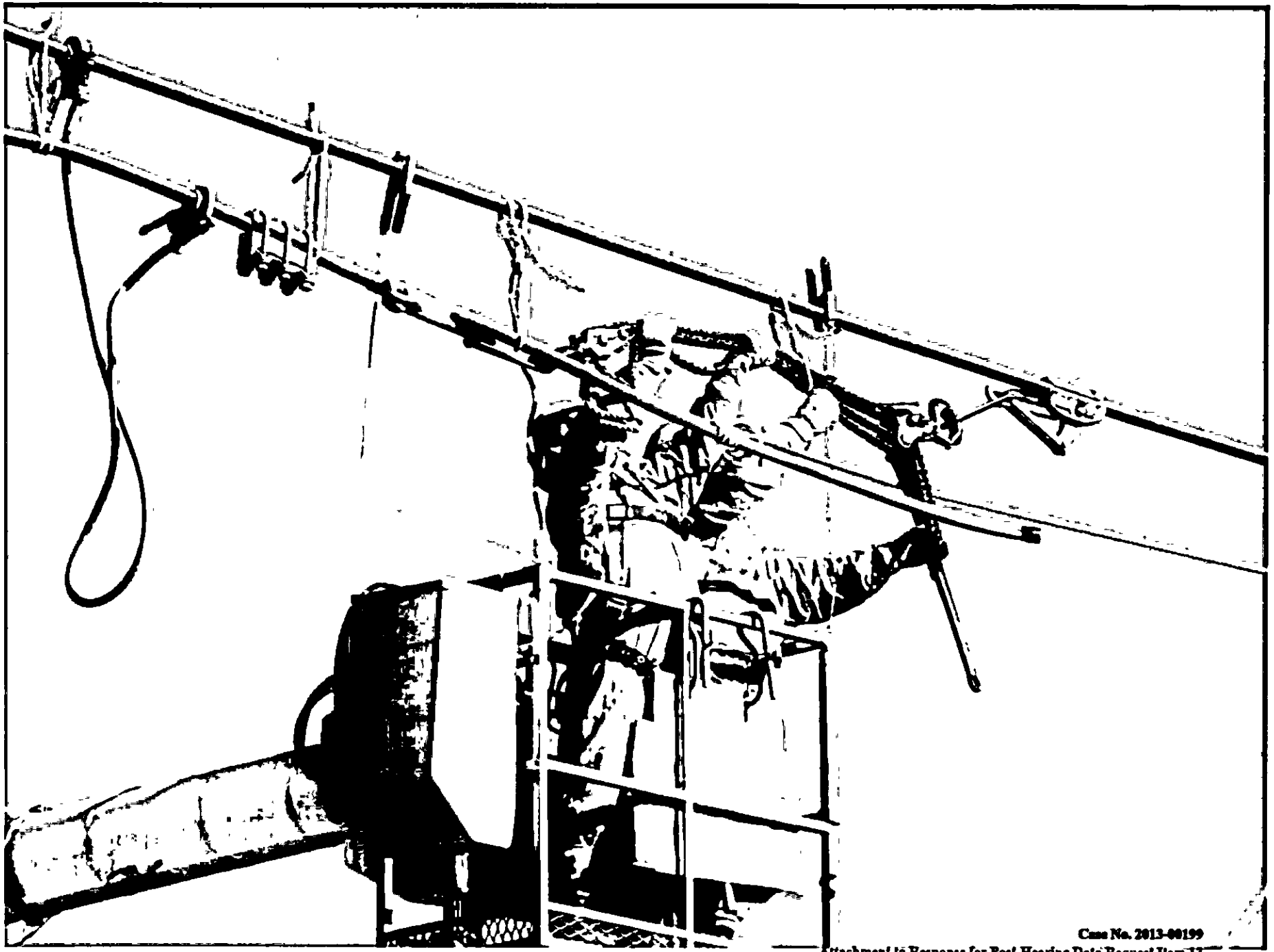
SUBSCRIBED AND SWORN to before me
on this 21st day of November, 2013

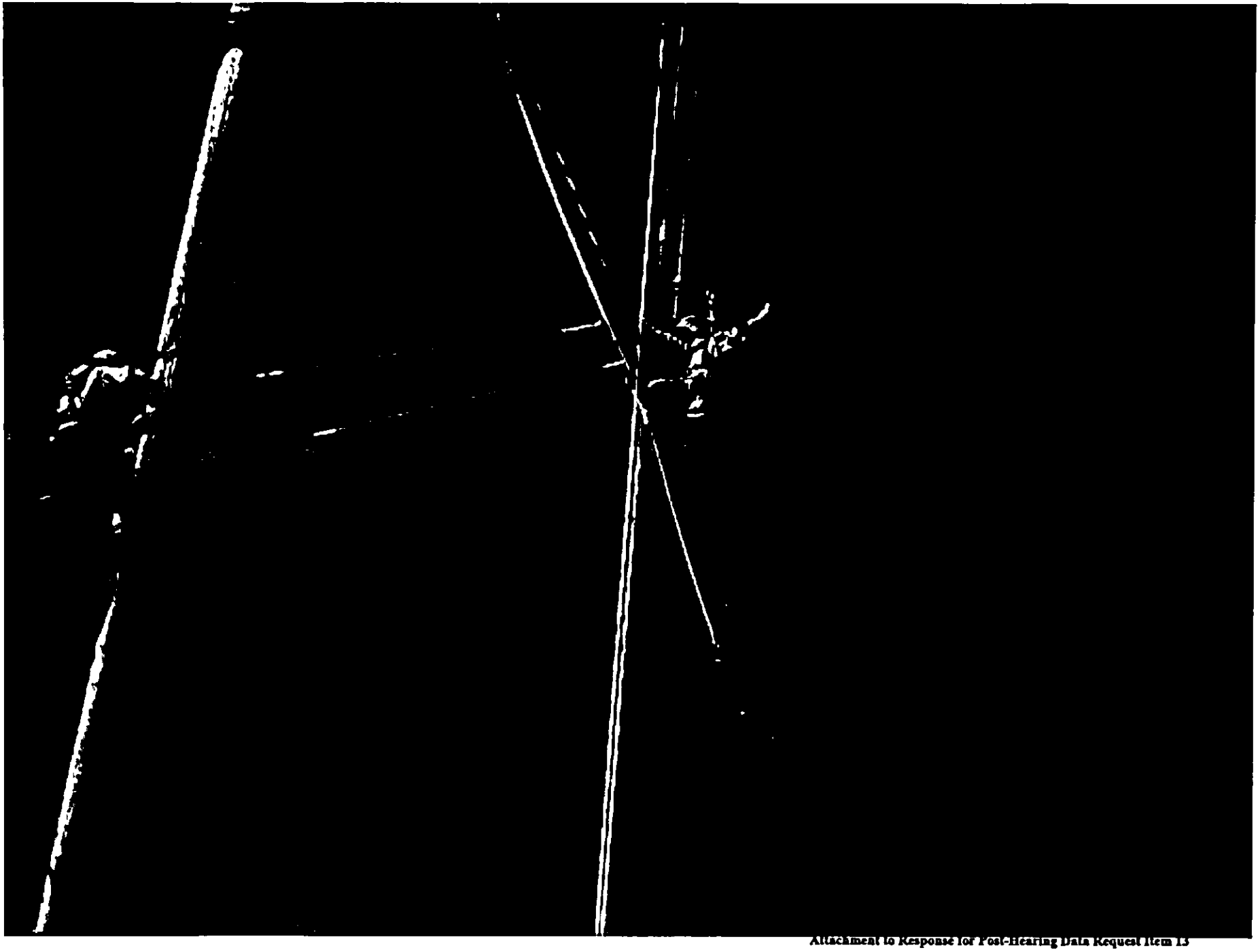
Notary Public

My commission expires: April 22, 2017

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





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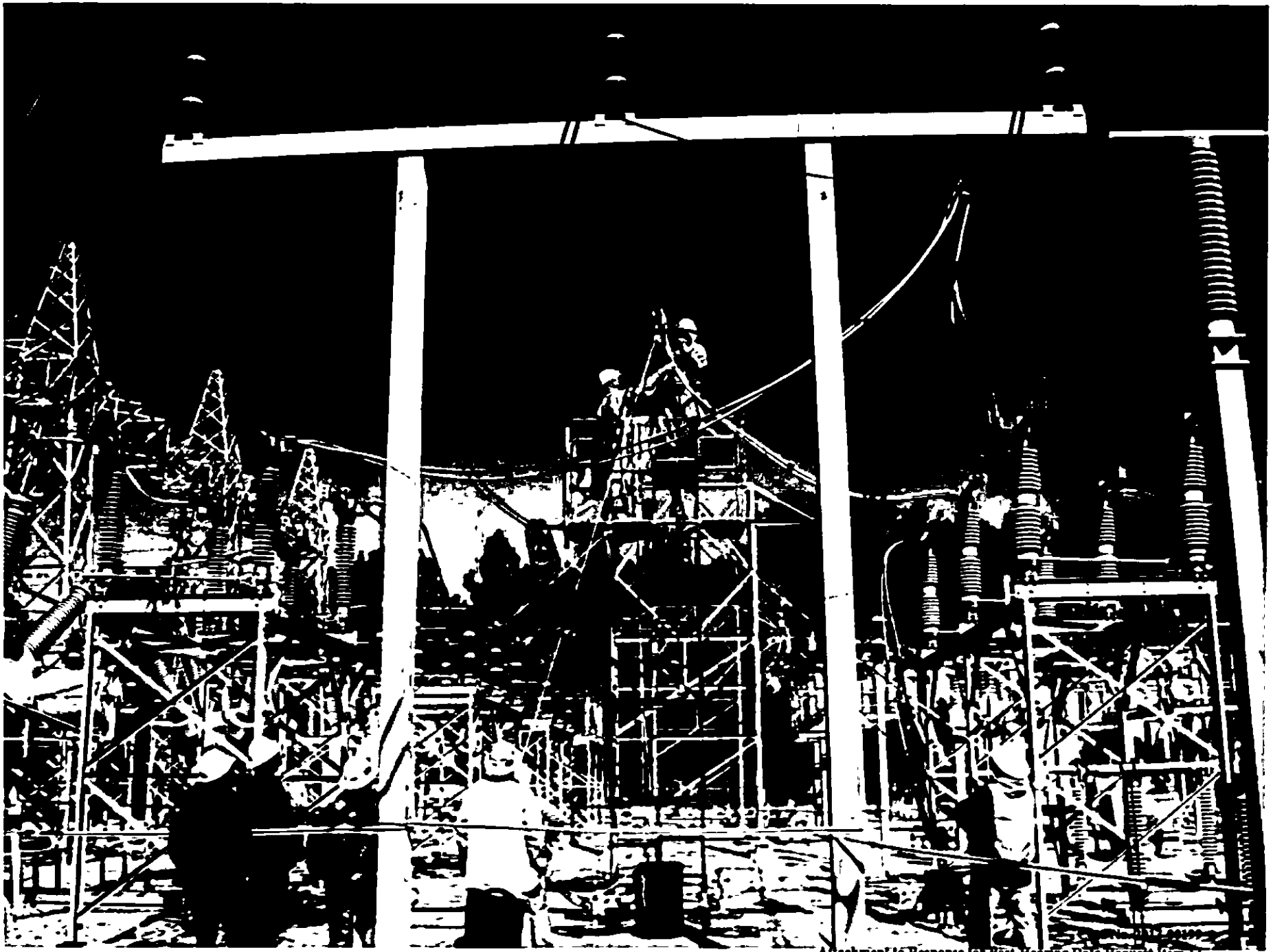

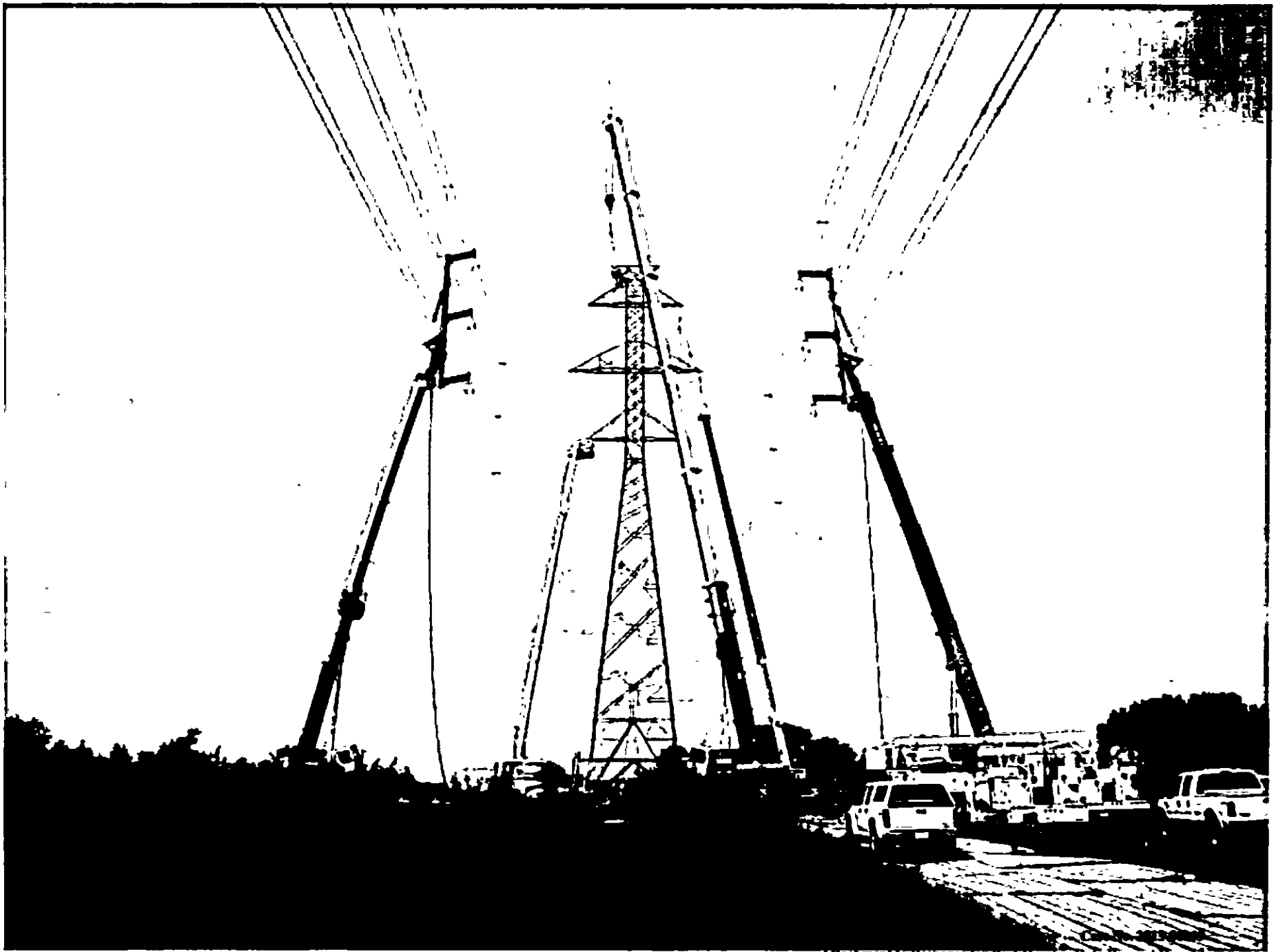

CERTIFICATE OF SERVICE

I hereby certify that I have this day served, via first-class mail, electronic transmission, or hand-delivery the foregoing upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Washington, DC this 22nd day of November, 2013.

/s/ Robert A. Weishaar, Jr.

Robert A. Weishaar, Jr.
McNees Wallace & Nurick LLC
777 North Capitol Street, NW
Suite 401
Washington, DC 20002-4292
Phone: (202) 898-5700
Fax: (717) 260-1765
rweishaa@mwn.com