Exhibit No.:
Witness: Joseph H. Haslag
Type of Exhibit: Direct Testimony
Issues: Noranda Economic Impact
Sponsoring Party: Noranda Aluminum, Inc.
Case No.: ER-2010-0036

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of Union Electric Company, d/b/a AmerenUE's Tariffs to Increase Its Annual Revenues for Electric Service	)	**Case No. ER-2010-0036** Tariff Nos. YE-2010-0054 and YE-2010-0055

Direct Testimony of Joseph H. Haslag

On behalf of

Noranda Aluminum, Inc.

January 6, 2010

Noranda Exhibit No. 423
Date 3-24-10 Reporter DF
File No ER-2010-0036

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STATE OF MISSOURI)
) **SS**
COUNTY OF BOONE)

Affidavit of Joseph H. Haslag

Joseph H. Haslag, being first duly sworn, on his oath states:

1. My name is Joseph H. Haslag. I am a professor and hold the Kenneth Lay Chair in Economics at the University of Missouri. My business address is Department of Economics, University of Missouri, Columbia, Missouri 65211.

2. Attached hereto and made a part hereof for all purposes is my direct testimony, which was prepared in written form for introduction into evidence in Missouri Public Service Commission Case No. ER-2010-0036.

3. I hereby swear and affirm that the testimony is true and correct.

Joseph H. Haslag

Subscribed and sworn to before me this 4 day of January, 2010.

SANDRA L. THURMOND
Notary Public - Notary Seal
State of Missouri - City of St. Louis
My Commission Expires Aug. 29, 2010
Commission #06430135

Notary Public

Before the

Missouri Public Service Commission

Case No. ER-2010-0036

Prepared Direct Testimony of Joseph H. Haslag

Q: Please state your name and business address.

A: Joseph H. Haslag; Department of Economics, University of Missouri, Columbia, MO 65211.

Q: What is your occupation, where are you employed and how long have you held your current position?

A: I am a professor and hold the Kenneth Lay Chair in Economics at the University of Missouri. I have been in my current position for nine years.

Q: Please summarize your educational background and experience.

A: PhD in Economics from Southern Methodist University, economist in Research Department at the Federal Reserve Banks of St. Louis and Dallas, adjunct faculty at Southern Methodist University from 1987 through 2000, University of Missouri since 2000.

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to explain the impact that Noranda's New Madrid plant has on the economy of the state of Missouri. Other witnesses will explain

the impact of AmerenUE's electric rates on Noranda and the potential they have to cause the closure of Noranda's plant. My testimony is provided to assist the Commission in understanding the consequences to Missouri's economy that would result from a closure of Noranda's New Madrid plant.

Q: Please explain your approach to measuring the impact of the closing of Noranda's plant on Missouri's economy.

A: I have quantified the impact of the closing of Noranda's plant in terms of the effect on the value of final goods and services produced within Missouri's borders each year; that is, Missouri's state Gross Domestic Product (GDP). In addition, I have computed the effect on state and local government tax collections, and on state payments of unemployment insurance benefits.

Q: What facts have you relied on in preparing your testimony, and what is the source of that information?

A: Noranda Aluminum, Inc. is a leading North American integrated producer of value-added primary aluminum products. Noranda is a private company owned by affiliates of Apollo Management, L.P. The company was founded in 1968 and operates an aluminum smelting plant at St. Jude Industrial Park near New Madrid, Missouri. Noranda has supplied data on personnel and taxes paid at the New Madrid plant. Noranda has also supplied data on the salvage and replacement value of the physical plant operated in New Madrid. My testimony is

based on the data provided by Noranda. The economic modeling and the calculations described below are solely my determinations.

Q: How would you summarize your conclusions?

A: Overall, the New Madrid smelting plant operated by Noranda has a large economic impact compared to typical business operations in Missouri. It employs a large number of people and has a large capital stock utilized to smelt aluminum. It is my conclusion that the three main economic impacts of the closing of Noranda's New Madrid plant would be:

1) State Gross Domestic Product – over a period of twenty-five years, the impact of the New Madrid facility on the Missouri economy, after discounting, is computed to be $2,996 million. In other words, Missouri's economy would forego nearly $3 billion in economic activity over the next twenty-five years if the Noranda plant were closed.

2) Taxes – State and local tax collections would be reduced. Net general revenue from state taxes over the next twenty-five years, after discounting, would be $113.86 million lower without the Noranda plant compared with an economy projection in which the Noranda plant's physical capital is fully utilized. In addition, local taxes would also decline. By my estimates, the present value of property taxes on tangible personal property would be reduced by $34.6 million; real estate taxes would decline by $27.7 million; and the state of Missouri would collect $2.6 million less in unemployment insurance taxes.

3) Unemployment Insurance Benefit Payments – Closing the Noranda plant would result in layoffs. Unemployment insurance benefits paid by Missouri are expected to be nearly $2.7 million if the plant closure occurred during a business cycle expansion. Benefit costs could be much higher if the plant closed during a recession. Indeed, unemployment insurance benefits paid to Noranda's workers could be as high as $7.6 million during this current recession.

Q: Are your conclusions based on generally accepted economic theory?

A: Yes. Economic theory provides the basis for my calculations. I followed the *Ak* growth model developed by Rebelo in 1991 and implemented by Ireland in 1996 in computing the effect that the reduction in the physical capital stock attributable to Noranda's plant closure would have on the Missouri economy. The basic idea is that, after accounting for the basic labor input, physical plant and human capital are combined via the existing production technology, yielding Gross Domestic Product (GDP) at the state level.

Q: What mathematical formula did you use to calculate the effect of Noranda's plant on Missouri's Gross Domestic Product?

A: The production of final goods and services produced within Missouri's boundaries is represented by the function:

$$Y_t = Ak_t$$

where Y stands for Missouri's GDP for a year indexed by t, k the quantity of human and physical capital employed at date t, and A is the technology that

represents the rate at which human and physical capital are transformed into units of final goods and services. This equation serves as the basis for computing the effect that Noranda's New Madrid plant has on the Missouri economy. There is a market value of the plant's physical capital. We treat the human capital input as being retained in Missouri, while the physical capital input vanishes in the case of a plant closure. Put another way, *k* changes as the operation of the Noranda plant changes. With *A* fixed, it is straightforward to compute the change in Missouri's GDP (represented by *Y* in the equation), that corresponds to a change in *k* employed within Missouri's boundaries.

Q: Does this model take into account changes to Missouri's economy over time?

A: Yes. Since the changes impact the Missouri economy over time, this model explicitly deals with the time domain. Indeed, the time subscript (represented by the small *t* in the equation) identifies the relationship between human and physical capital and GDP *at a point in time*. By allowing the time period to change, the model economy allows for Missouri's GDP to evolve over time. More concretely, the *Ak* model replicates the fact that the Missouri economy, on average, grows over time. I used this feature of the model economy to compute the evolution of the Missouri economy over time, with and without the physical capital employed by the Noranda plant.

Q: Is there another way of describing your computation?

A: Yes. I have used the economic model described above to quantify the impact of Noranda's plant on the Missouri economy. This impact is computed by considering the following thought experiment. The baseline path involves the path for the Missouri economy over time *with* the Noranda plant, and all other human and physical capital employed in Missouri. This is the "control" for the experiment. The alternate is based on the case in which the physical capital employed by the Noranda plant has vanished, beginning today and continuing for the next twenty-five years. When I compare the control with the alternate, I interpret the difference between the two as the economic impact of the Noranda plant.

Q: Please describe the specific steps included in your computation of the economic impact of the Noranda plant in Missouri.

A: As noted above, I looked at this question by comparing the expected path of Missouri's economy with the plant and the expected path of Missouri's economy without the plant. The first step is to determine the baseline, which is a forecast of the path of Missouri's Gross Domestic Products (GDP) for a twenty-five year period assuming the Noranda plant continues to operate. The second step is to compute the path of Missouri's GDP taking the capital of the Noranda plant out of the equation.

Q: How did you compute the baseline path—the expected path of Missouri's economy with the Noranda plant?

A: The baseline path is constructed using the average annual growth rate in Missouri's real GDP between 1995 and 2006. I focused on real GDP in order to avoid having to forecast future movements in the inflation rate. The average annual growth rate for Missouri's GDP is 1.29 percent. The Bureau of Economic Analysis reports that Missouri's 2008 real GDP was $193.775 billion. Here, real GDP is measured as state GDP using a chain-weighted index in which the base period is 2000. For each year between 2008 and 2033, I forecasted Missouri's GDP by following the equation: $Y_t = 1.01295 * Y_{t-1}$, where Y is state real GDP. I initialized this forecast with Missouri's 2008 GDP, that is, Y_{2008} = $193.775 billion.

Q: What is the expected growth in Missouri GDP over twenty-five years with the Noranda plant?

A: Using this formula, it is my conclusion that the Missouri GDP will grow from $193.775 billion in 2008 to $297.299 billion in 2033 with the Noranda plant operations.

Q: How did you compute the alternate path—the expected path of Missouri's economy without the Noranda plant?

A: I constructed the alternate path by treating the physical capital stock at the Noranda plant as being non-productive for a twenty-five year period. This means

that economic value goes to zero. As with the baseline path, I used values taken from 2008 to initialize the economic impacts. Noranda reports that the undepreciated value of its physical capital stock is $900 million at the plant. Following the *Ak* growth model, I computed the effect that the reduction in the physical capital stock would have on the Missouri economy. Here, the value of *A* is calibrated to hit the average annual growth rate of the Missouri economy, that is, $A = 0.17767$. The change in the capital stock is -$900 million. By subtracting the product of the annual growth rate of the Missouri economy and the change in capital stock, that is: *0.17767*(-$900 million)*, I estimated the impact of the loss of this capital stock on the final goods and services produced in Missouri. In this case, with the loss of $900 million of physical capital, Missouri's GDP would decline by $159 million compared to its baseline level. This means that without the productive capacity of Noranda's plant, Missouri's 2008 real GDP would be $193.615 billion rather than $193.775 billion. Because the physical capital loss is a one-time event, the *Ak* model economy does not recognize any decline in the state economy's growth rate. Thus, I followed the same method to construct the path for Missouri's GDP for the next twenty-five years; that is, *T*+25, without the capital stock of the Noranda plant. By following this method, I computed the revised Missouri GDP, $Y^{\infty}_{T+25} = \$267.078$ where Y^{∞} denotes the revised level of Missouri GDP without the Noranda physical capital. With two values of Missouri GDP, the economic impact of the Noranda plant over the next twenty-five years is the discounted sum of the differences between projected Missouri

GDP with Noranda's physical capital and the projection in which Noranda's physical capital is omitted. This is expressed by the following equation:

$$\sum_{t=T}^{T+25} \rho^{t-T}(Y_t - Y_t^-)$$

where ρ is the discount factor, or the rate at which one discounts the future levels of Missouri GDP. Here, I use ρ = 0.96.

Q: What is your conclusion concerning the expected growth in Missouri GDP over twenty-five years without the Noranda plant?

A: Using this formula, it is my conclusion that the discounted sum of Missouri's foregone GDP associated with Noranda's lost physical capital is $2.996 billion over the next twenty-five years. In other words, without the Noranda plant, Missouri's GDP will be $2.996 billion less than it would be with the Noranda plant over this twenty-five year period.

Q: How did you determine the impact of the closing of Noranda's plant on state tax revenues?

A: Once the economic impact in terms of foregone state GDP is computed, it is straightforward to compute the impact on Missouri's tax revenue. I looked at "net general revenue" for the state which includes Missouri individual income taxes, Missouri corporate income taxes, Missouri franchise taxes and other taxes paid to the state general revenue fund (including some Missouri sales and use taxes). Here, net refers to amounts collected after refunds. On average, Missouri's net general revenue fund receives 3.8 cents per dollar of average amount of state

GDP. I multiplied 0.038 times the amount of state GDP to compute the expected loss to state net general revenues over the next twenty-five years that would result from the closing of Noranda's plant.

Q: What is your conclusion concerning the effect of the closing of the Noranda plant on state net general tax revenues over the next twenty-five years?

A: My calculations indicate that Missouri state government would forego the collection of $113.86 million over the next twenty-five years if the Noranda plant closed. That is, state general revenue funds would be reduced by $113.86 million.

Q: What other tax collections would be affected by the closure of the Noranda plant?

A: Noranda pays other state and local taxes as a result of the operation of the plant. I have calculated the impact of Noranda's plant closing on personal property tax, real estate tax, and unemployment insurance tax.

Q: How did you determine the impact of the closing of Noranda's plant on personal property tax collections?

A: Noranda reports that in 2008, it paid $1.845 million in property taxes on tangible personal property. I assumed that the tax bill grows at the same rate at the Missouri state GDP; that is, 1.29 percent. I applied this growth rate in the

property tax bill for the period 2008 through 2033. I discounted the future tax liabilities at the same rate as I did in the case of the foregone state GDP.

Q: What is your conclusion concerning the effect of the closing of the Noranda plant on personal property tax collections over the next twenty-five years?

A: It is my conclusion that the discounted sum of future personal property taxes that would not be paid by Noranda if the plant were closed is equal to $34.588 million over the next twenty-five years.

Q: How did you determine the impact of the closing of Noranda's plant on real estate tax collections?

A: Noranda paid $1.477 million in real estate taxes in connection with its plant in 2008. I assumed that the tax bill would grow at the same rate as the Missouri state GDP. I applied this growth rate in the real estate tax bill to the period 2008 through 2033. I discounted the future tax liabilities at the same rate as I did in the case of the foregone state GDP.

Q: What is your conclusion concerning the effect of the closing of the Noranda plant on real estate tax collections over the next twenty-five years?

A: It is my conclusion that the discounted sum of future real estate taxes that would not be paid by Noranda if the plant were closed is equal to $27.673 million over the next twenty-five years.

Q: How did you determine the impact of the closing of Noranda's plant on unemployment insurance tax collections?

A: In 2008, Noranda reports that it paid $140,000 in unemployment insurance payments to Missouri. I assumed this tax bill would grow at the same rate as state GDP. I computed the foregone unemployment insurance payments for the period 2008 through 2033, discounting future payments by the same rate as I did in the case of the foregone state GDP.

Q: What is your conclusion concerning the effect of the closing of the Noranda plant on unemployment insurance tax collections over the next twenty-five years?

A: It is my conclusion that the discounted sum of future unemployment insurance taxes that would not be paid by Noranda if the plant were closed is equal to $2.642 million over the next twenty-five years.

Q: How would you summarize the effect of closing Noranda's New Madrid plant on state and local tax collections?

A: The upshot is that if the Noranda New Madrid plant were closed, there would be costs in the form of foregone state GDP. Because the Missouri economy would

shrink, there would be fewer taxes collected by both state and local governments. I estimate that the lost state and local revenues would be $178.76 million over a generation. Schedule 1 summarizes the cost the state and local governments in the form of lost tax receipts.

Q: What data did you rely on in determining the impact of the closing of Noranda's plant on Missouri unemployment insurance benefit payments?

A: If the Noranda plant were to close, there would be additional costs to Missouri state government in the form of unemployment insurance claims made by workers separated from work. The average unemployment duration is 9.5 weeks. Note that 9.5 is the unconditional average number of weeks that a person is unemployed. In other words, the average duration is not conditional on the current state of the aggregate United States' economy. According to data published by the Bureau of Labor Statistics, the average duration of an unemployment spell is 26.9 in October 2009. The median duration is 18.7 weeks. These data are published at: http://www.bls.gov/news.release/empsit.t09.htm. Missouri's unemployment benefits are computed based on the worker's quarterly wages. Specifically, a worker's weekly benefit amount (WBA) will be 4 percent of the average of the worker's two highest quarters, but cannot be more than $320.

Q: What other facts did you rely on in determining the impact of the closing of Noranda's plant on Missouri unemployment insurance benefit payments?

A: While I do not have data on the individual workers' salaries at Noranda, officials tell me that the average total wage for hourly Noranda employees is $60,000. Their average quarterly wage is $15,000. Weekly unemployment benefits in Missouri are calculated as 4 percent of average quarterly salary or $320, whichever is smallest.

Q: How did you determine the impact of the closing of Noranda's plant on Missouri unemployment insurance benefit payments to Noranda's hourly employees?

A: Since 0.04 times $15,000 is $600, I assumed that each of the hourly employees at the Noranda plant in New Madrid, Missouri would receive weekly benefits equal to $320. I then applied the median number of weeks of benefits, and found that expected weekly unemployment insurance benefits paid to these workers would be $4,230,628. If I used the sample mean duration instead of the median duration, the expected unemployment insurance benefits would be $6,085,856.

Q: How did you determine the impact of the closing of Noranda's plant on Missouri unemployment insurance benefit payments to Noranda's salaried employees?

A: If each of Noranda's salaried employees receives unemployment insurance benefits for 18.7 weeks, at $320 per week, the benefits paid to the salaried employees would be $1,065,152. If those benefits were paid for 26.9 weeks, on average, the total unemployment insurance bill owing to the Noranda New

Madrid plant would be $1,532,224. If the expected unemployment spell lasted only 9.5 weeks, the expected unemployment insurance bill would be $541,120. Schedule 2 summarizes the total unemployment insurance bill for both hourly and salaried Missouri residents for each of the three alternative expected-duration assumptions.

Q: **How would you summarize the effect of closing Noranda's New Madrid plant on the payment of Missouri unemployment insurance benefits?**

A: If the Noranda New Madrid smelter plant were to close, the state of Missouri would face an increase in its unemployment insurance benefit payments, ranging from $2.69 million to $7.6 million depending on the macroeconomic conditions under which the plant closing occurred.

Q: How would you summarize your conclusions concerning the impact of the closing of Noranda's plant on the Missouri economy?

A: I have applied standard economic theory to compute the effect that eliminating Noranda's New Madrid smelter plant would have on the Missouri economy. I treated the case in which the physical capital employed by Noranda vanishes. For the twenty-five year period after the plant vanishes, the discounted sum of lost state GDP is $2,996 million. In addition, state and local government revenues are not paid. The discounted sum of lost net general revenue paid to the state is $113.86 million over the twenty-five year period. Personal property taxes, real estate taxes and unemployment insurance tax collections would also

be reduced by $34.59 million, $27.67 million, and $2.64 million, respectively. Finally, the state would incur costs as a result of the payment of unemployment insurance benefits. If the plant shutdown occurred, on average, the state would expect to pay nearly $2.7 million in unemployment insurance benefits. If, however, the plant shutdown occurred during a recession, the state would expect to pay over $7.6 million in unemployment insurance benefits.

Schedule 1 summarizes the cost the state and local governments in the form of lost tax receipts.

Schedule 1

Tax Category	Present value summed over 25 year period
Net General Revenue foregone	$113.86 million
Property Tax (not collected)	$34.59 million
Real Estate Tax (not collected)	$27.67 million
Unemployment Insurance Tax (not collected)	$2.64 million

Schedule 2 summarizes the total unemployment insurance bill for both hourly and salaried Missouri residents for each of the three alternative expected-duration assumptions.

Schedule 2

Employee category	Mean unemployment duration = 9.5 weeks	Median unemployment duration = 18.7 weeks	Mean unemployment duration = 26.9 weeks
Hourly	$2,149,280	$4,230,688	$6,085,856
Salaried	$541,120	$1,065,152	$1,532,224
Total	$2,690,400	$5,295,840	$7,618,080