Via Electronic Submission

April 10, 2017

Ms. Cheryl Moss Herman
U.S. Department of Energy
Office of Nuclear Energy
Mailstop B-409
19901 Germantown Road
Germantown, MD 20874-1290

Subject: Excess Uranium Management: Effects of DOE Transfers of Excess Uranium on Domestic Uranium Mining, Conversion, and Enrichment Industries; Notice of Issues for Public Comment, 82 FR 13106 (March 9, 2017)

Dear Ms. Moss Herman:

On March 9 DOE issued a follow up Notice of Issues for Public Comment (NIPC) on comments, data and information submitted in response to the original July 19 request for information (RFI) on the effects of DOE transfers of excess uranium on the domestic uranium mining, conversion and enrichment industries. Fluor-BWXT Portsmouth LLC (FBP) is the Decontamination & Deconstruction (D&D) contractor as set forth in our Prime contract (Contract DE-AC30-010CC4017) at the Portsmouth Ohio gaseous diffusion plant (GDP) site administered by the the Environmental Management Paducah-Portsmouth Project Office (PPPO) in Lexington KY and we respectfully respond to this NIPC. In addition to managing approximately 2,000 enrichment plant D&D employees, FBP receives transfers of Department of Energy (DOE) owned UF6 as barter in exchange for equivalent value D&D services at the site. FBP's response to the RFI is at https://www.energy.gov/sites/prod/files/2016/10/f33/2016_RFI_Fluor-BWXT_0.pdf .

Unless full appropriation funding is in place at Portsmouth GDP, FBP advocates that DOE reafirm current levels of DOE uranium transfers (***Base Scenario***) of 2,100 MTU until CY 2020. FBP and its market/economic consultants have reviewed the NIPC information and offer our assessment that the continued, predictable DOE transfer of these quantities does not create an adverse material impact upon the domestic uranium mining, conversion and enrichment industries. FBP recommends to the Department that if full appropriations for Portsmouth D&D cannot be secured to "Stay the Course" and finish the recovery, transfers, and sales of excess DOE natural uranium (UF6) over the next three years. Maintaining the Base Scenario EM rate of 1,600 MTU per year rate fulfills one of the most-cited encouragements from the nuclear industry: disposition of the excess inventories in a predictable, transparent manner.

FBP offers new information in this NIPC submittal for consideration in the Secretarial Determination process:

1. A new FBP subcontract (provided under confidentiality provisions) that provides a positive material impact on the conversion industry. FBP is subcontracting to ConverDyn-Metropolis Works in Illinois over 50% of its uranium transfer preparation workscope of 1,600 MTU per year for the DOE-EM barter quota

2. Barter sales through FBP, by Traxys North America (Traxys), have been made to the US uranium sector to help support their long-term business

3. An econmist's and principal with Capital Trade Inc, Mr. Daniel Klett's opinion that ERI's newly introduced cumulative market clearing analysis is fundamentally flawed (without a basis in economics -*See attached Capital Trade, Inc. report*) and that DOE should continue to use the ERI annual market clearing analysis

4. An expert's, NAC International Inc, opinion that the same limiting market share methodology used for ERI's Conversion industy analysis should also be applied to the Uranium Concentrate sector to properly assess the impact of the barters

It is FBP's position that DOE transfers have not had, nor will they have, an adverse material impact on the domestic uranium mining industry. In order for there to be a material impact, DOE transfers must have been, or forecasted to be, the cause of reduced prices and/or the loss of sales volumes sufficient to cause material harm of real import and great consequence beyond the scale of normal market fluctuations. If price effects are calculated as they should be, using the annual market clearing approach, the only rational conclusion is that DOE transfers have no adverse material impact on price. However if DOE determines there has been a material impact on market prices, then the impact of those prices on the US domestic industry must be determined.

As discussed later in this document, the US uranium mining industry has maintained a market share of 2 to 3 percent of world production over the last 8 years. Even if 1) DOE transfers were reduced to zero and 2) the US domestic uranium miners obtained even the upper end of this range in additional sales, the additional sales volume would equate to only 48 MTU (125,000 pounds). Thus, regardless of the calculated price impact of the DOE transfers, the theoretical increase in market share is too small for DOE transfers to have resulted in an adverse material impact to the domestic industry.

Using the Capital Trade recommended annual clearing price impact, US production costs are well above the obtainable prices without DOE transfers. Therefore, absent DOE transfers the US mining industry would not have been in a position to make any new sales as their production costs would have still been non-competitive. Even adding the spot price to the higher price impacts calculated by ERI using the cumulative price technique, market prices would still be below the cost of US production with no DOE transfers (see the ERI report at page 74). Thus, there can be no price harm in regard to new sales.

A potential harm could be to prices in existing contracts or in new spot sales. The prices being received for US origin uranium as reported by EIA ($44 for 2015), are substantially above even the current spot price plus the ERI cumulative price impact. The prices are higher because they are being predominately set by base or floor prices that were established some years ago in term contracts and have no tie to market prices. Although there was some volume of spot sales by US producers, the quantities were small, just 3% of US production in 2015 (ERI at page 121). Several of the US producers publish information that supports this conclusion. Consequently, these prices are also unaffected by the current spot prices, and there can be no material impact on existing contract deliveries.

Regardless of the approach used, the US domestic mining industry has not suffered an adverse material impact due to the DOE uranium transfers at current levels. The following provides additional support for the above statements and conclusions.

1. Domestic converter will receive UF6 services work for up to 60% of DOE EM Base Case barters

FBP has entered into a subcontract with ConverDyn for Metropolis to share FBP's 1,600 MTU per year quota to prepare UF6 cylinders needed to fulfill DOE-to-FBP natural uranium barter transfers. FBP subcontracted to ConverDyn-Metropolis, the only domestic converter, approximately $4 million per year for services in 2017 and 2018. In 2016 FBP and ConverDyn piloted the cylinder preparation process and completed about $1 million worth of the UF6 services. The ERI analysis of the conversion industry captured the market share and production cost impacts—but not the positive impact of FBP subcontracting with ConverDyn to support the DOE uranium transfer barter program. FBP would have to indefinitely defer or cancel this FBP-to-ConverDyn subcontract if the level of funding from the Base Case (1,600 MTU/year) were reduced or eliminated.

ERI also did not take into account the recent change in capacity at the Metropolis plant. It is our understanding that the new, rightsized, nameplate production capacity at Honeywell's Metropolis Works Facility will be permanently scaled back to 7,000 metric tons of uranium hexafluoride (UF6) production. This will be achieved through physical changes to the conversion plant as well as through workforce reductions. It is also our understanding that there are no plans to return to the previous nameplate capacity of 15,000 metric tons in the future since actual production has averaged only slightly more than 50% of that capacity over the last five years. This right-sizing decision is aligning the plant with the long-term market prospects in the post-Fukushima market environment.

2. Barters directly support US uranium production industry

In addition to assisting the U.S. conversion industry, the majority of the 2016-2018 uranium barter transfers are already committed through contracts by FBP's subcontractor Traxys to both U.S. nuclear utilities and to help struggling domestic uranium production. The FBP barters offset foreign imports—U.S. buyers imported 94 percent of uranium requirements in 2015. Additionally, a leading Wyoming uranium producer is preserving its U.S. production operations and staff by reducing production levels while purchasing the DOE-FBP-Traxys supplied uranium to deliver on higher-priced long-term contracts. This support was a direct result of the U.S. miners calling upon the Department and FBP to make DOE uranium available to U.S. producers that they could then deliver into their long-term contracts and Traxys has extended this same offer of FBP-bartered uranium to the other US producers as well.

3. The newly introduced cumulative market clearing analysis is fundamentally flawed – annual market clearing should be used

In its earlier studies on the effects of DOE uranium inventory transfers, ERI relied on a methodology where DOE's actual annual releases into the market were used to determine the supply curve shift leading to a new equilibrium price, and its estimated price effects. The ERI 2017 Report also relied on this methodology for its "annual price clearing methodology" estimates of price effects of DOE inventory releases, but supplemented this with an alternative "cumulative price clearing methodology". This new methodology found larger price effects by including not only inventories sold into the market by DOE each year, but also "inventory overhang" price effects associated with DOE inventories held by users. The price effect estimates using ERI's cumulative methodology should be rejected.

There is no basis in economics why a specific volume of DOE releases sold into the market in year X, which clearly have price effects in that year, based on standard economic theory, will continue to have price effects in all later years based on "being held in inventory". ERI has not explained the mechanism for how this would occur, other than a general reference to "inventory overhang" effects. In fact, taken to its logical conclusion, and its recognition that uranium markets are global in nature (ERI 2017 Report, at 46), the size of all cumulative excess uranium inventory stocks worldwide would also affect market prices, according to ERI's theory. As shown in Attachment 3 (*which includes data from 2009 to 2020 on worldwide reactor requirements, primary supply, and secondary supply*) of the attached Capital Trade report, extending ERI's cumulative methodology to include all inventories would result in cumulative excess supply exceeding demand (reactor requirements) for each year from 2017 to 2020. This relationship would result in price forecasts for these years to be approaching zero—just one way to quantitively show the results of using this method that is flawed.

There are other serious flaws with ERI's cumulative methodology for price effect estimates. First, the market clearing principle that price equals marginal cost is violated, and this is a principle widely accepted and used in the uranium market for price determination estimates, and for competitive markets generally. In its other studies, ERI has relied solely on the annual methodology, with the price effects being estimated based on the shift in the supply (cost) curve attributed to the DOE inventory introduced into the market each year, and the consequent change in the marginal cost supplier associated with a given level of demand, with an associated effect on price.[1]

Second, regarding any "inventory overhang" effect, this might affect the timing, but not the magnitude of price effects, based on sellers and buyers behavior. Firms could alter their behavior in anticipation of expectations of future inventory releases or build-ups. For example, in the case of an inventory overhang, sellers may have an incentive to accelerate their own shipments into the market in anticipation of possible future price decreases if they expect future liquidation of excess inventory by their competitors. Buyers, however, may have an incentive to delay their purchases. Ultimately, however, the manifestation of any "timing" effects of an inventory overhang on the market clearing price must be sales of that inventory into the market.

Third, ERI is unclear and inconsistent with regard to when and how a particular volume of DOE inventory has an effect on market price. When sold into the market? When used by the utility? And if held in inventory by users after being sold by the DOE, what is the economic mechanism by which such inventory stock itself can have a continuing effect on the market price? For example, ERI assumed that the historical transfers of BLEU and ENW material would have a market price impact when used to produce the required nuclear fuel, not when it was sold.[2] If the DOE transfers since 2014 were treated in the same way, the impact in 2014 would be zero as any sales were offset by production decreases or held in inventory for future sales.

Fourth, as a partial offset to the DOE inventory releases, ERI states that there has been or will be some primary mine shutdowns.[3] However, it is difficult to determine how the mine shutdown levels given by ERI were determined, or how these shutdowns were specifically factored into the cumulative methodology price effects presented in Tables 4.2 to 4.6. In fact, earlier in its report (at 45), ERI states that in an oversupplied market the removal of a particular component of secondary supply (i.e., DOE inventory) "does not result in a corresponding amount of new primary supply entering the market in its place, it instead reduces the amount of oversupply."

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[1] See, e.g., *ERI 2014 Report* at Figure 4.2, showing a shift of the supply curve to the left associated with removal of DOE inventories, resulting in a higher market clearing spot price than if DOE inventory had not be introduced into the market.
[2] See *ERI 2017 Report*, at 24.
[3] See *ERI 2017 Report*, at 52.

The ERI cumulative methodology is without a theoretical basis in economics, and is based on invalid assumptions. For example, the cumulative method assumes that DOE transfers that were sold in 2014 and presumably held in inventory by utilities and never sold again, would continue to affect the market clearing price for every year from 2014 through 2020. There is no explanation for the economic mechanism of how uranium held in inventory and not offered for sale after 2014 would continue to affect the supply and demand balance, and the market clearing price in future years. Attachment 2 shows DOE uranium releases from 2009 and projected releases through 2020. The cumulative supply increase from DOE inventory releases totals 42.5 million pounds through 2016, and 60.0 million pounds through 2020, similar to those given in the ERI 2017 Report (at 52).[4] As described, the price effect in ERI's cumulative methodology is the DOE inventory released into the market each year, plus DOE cumulative inventory releases, offset by primary production decreases (line K in the exhibit). These volumes averaged 40 million pounds annually from 2014 through 2020, compared to DOE inventories released into the market that averaged 5 million (including BLU and ENBW releases).

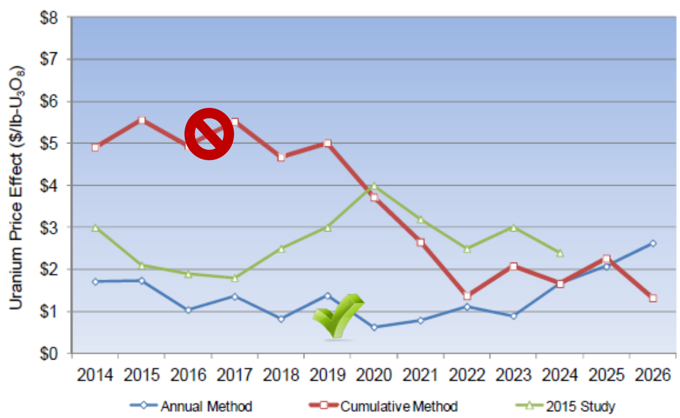

Figure 4.10 Base Scenario Uranium Price Effect for Annual and Cumulative Methods

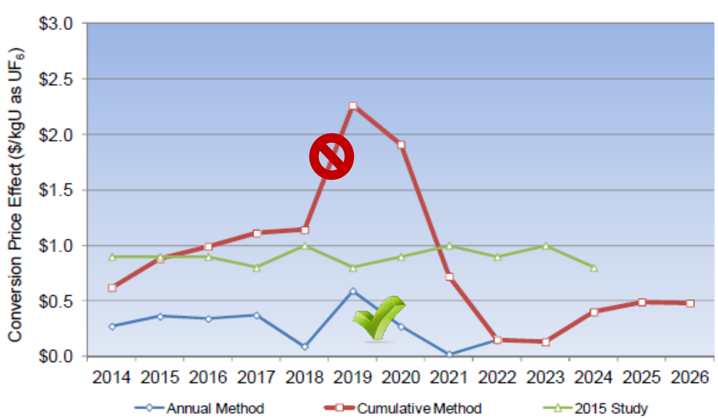

Figure 4.11 Base Scenario Conversion Price Effect for Annual and Cumulative Methods

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[4] The cumulative inventory amount given by ERI from 2009 to 2016 is 39 million, and through 2020 is 61 million pounds. ERI did not provide complete backup support for how these totals were derived. While the totals given in Attachment 2 differ somewhat from those in the ERI report, this does not undermine the factual point that there is a significant difference between the volume of DOE inventory sold into the market, and the sum of that sold into the market and existing past inventories.

4. ERI should apply the same market share limitation methodology used in the Conversion industry analysis for the Uranium Concentrate sector analysis

In its analysis of the conversion industry ERI considered the effect of DOE transfers on the conversion industry's market share. ERI correctly concluded that the nuclear fuel markets are international markets, thus a reduction in the quantity of DOE transfers will not result in a corresponding increase in domestic sales. The additional market demand created by a reduction in DOE sales will be subject to competition with international suppliers who will likely maintain their historical market share. ERI then performs an analysis of historical information to conclude that for the conversion industry, the US converter would realize 25% of any additional US demand and 23.6% of any additional demand in the remainder of the world.

Surprisingly ERI does not consider the effect of DOE transfers on the US uranium mining sector where foreign supplier market share is much higher. According to the EIA's 2015 Uranium Marketing Annual Report table S1.a, US origin uranium has been only 6% of the purchases made by owners and operators of US civilian nuclear power plants in the last two years (2014 and 2015) and only 12% in the last ten years covered by the report. The US origin market share for the world would be much lower as the US represents only a little over 2% of world production in 2016 and has averaged less than 3% since 2009. Thus if DOE completely eliminated all EM transfers (1600 MTU), US producer sales would increase by only 32 MTU (84,000 pounds) to less than 96 MTU (250,000 pounds). This small decrease in market share as a result of the DOE transfers cannot have a material impact on the US uranium mining industry.

If US producers managed to obtain the same market share of an increase in demand from the complete elimination of DOE transfers, the increase in US producers sales would be only 126 MTU or less than 328,000 pounds of U_3O_8. It is not credible to conclude that losing this extraordinarily small volume of sales (equivalent to 0.2% of world demand) would result in an adverse material impact on the US uranium mining industry. Due to the large excess worldwide production increases, neither spot market prices nor US production competitiveness are expected to improve appreciably in the near term.

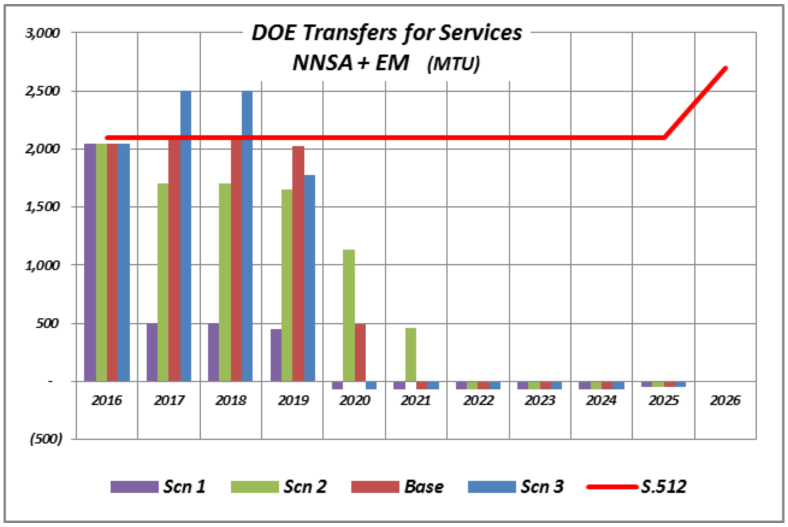
FBP Conclusion

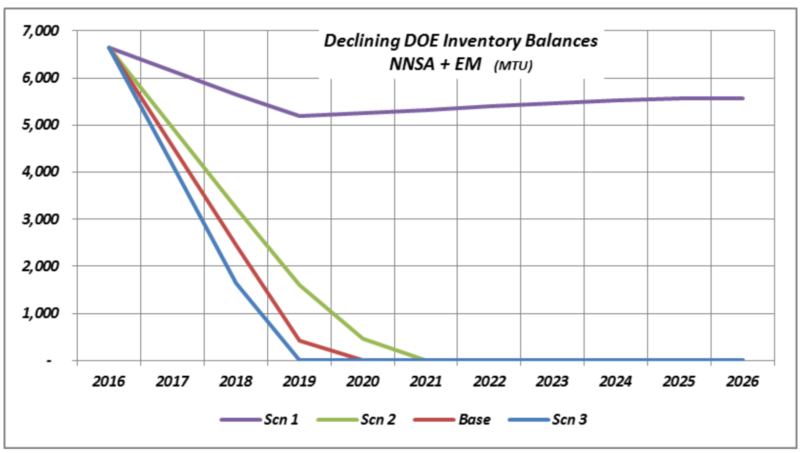
U.S. production has not fallen due to DOE transfers but instead fell due to decisions made by producers to expand their lower-cost assets in Canada and Kazakhstan, while scaling back their smaller (non-Tier 1) U.S. production facilities. At the same time DOE has reduced its EM Uranium Barter transfer quantities by 33 percent per year (Total NNSA and EM reductions of 25 percent). Therefore, FBP reiterates that "Base Case" is the right option for the 2017 Secretarial Determination outcome unless adequate funding can be provided to sustain our forward progress and our workforce.

FBP has listened to industry comments and acted to share its work scope with the domestic conversion industry and exhorted Traxys to work with the uranium, conversion and enrichment sectors in shaping, sharing and offering the placement of the FBP barter-derived uranium to these sectors.

Maintaining the Base Scenario EM rate of 1,600 MTU per year rate fulfills one of the most-cited encouragements from the nuclear industry: disposition of the excess inventories in a predictable, transparent manner. The last of the DOE near-term, natural UF6 inventories would substantially clear the overhang to the market during the next three years of 2017-2019, by first quarter 2020.

FBP's recommended "Base Case" option centers on the firm future quantitities of EM and NNSA uranium transfers only—and they are under proposed legislation quantity ceilings of 2,100 MTU through 2025, then 2,700. Additional future quantities from the proposed Global Laser Enrichment (GLE) uranium to be derived from DOE depleated uranium tails is not envisioned to even begin feed deliveries until 2024—and this potential stream is subject to economic hurdles to attain that schedule and beyond FBP's recommendation.





FBP is pleased to submit our comments on the summary of information DOE published in the Federal Register September 19, 2016.

Respectfully submitted,

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Review of Energy Resources, International Price Effect Estimates for Uranium Associated with DOE Inventory Releases

Daniel Klett, Principal
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4/6/2017

I. Scope of Work and CapTrade Background

Capital Trade, Inc. (CapTrade) prepared this report for Fluor-BWXT Portsmouth LLC., to review an element of the January 12, 2017 analysis conducted by Energy Resources International, Inc., (ERI), titled *Analysis of the Potential Effects on the Domestic Uranium Mining, Conversion, and Enrichment Industries of the Introduction of DOE Excess Uranium Inventory During CY 2017 Through 2026* (*ERI 2017 Report)* prepared for the U.S. Department of Energy. The specific area of CapTrade's review relates to ERI's estimates of price effects of DOE inventory transfers, at pp. 44 to 63 of the *ERI 2017 Report*. For purposes of its analysis, CapTrade has not reviewed the accuracy of the underlying data used in the *ERI 2017 Report*, such as the levels of DOE inventory affecting the uranium, conversion, and enrichment markets (e.g., Tables 3.10, 3.11, and 3.12, respectively), the supply (production cost) curves (e.g., Figure 4.1 for uranium), or uranium demand. Rather, the focus of CapTrade's analysis relates to the integrity based on economic principles of ERI's estimated price effects from the "Annual Clearing Price" vs. "Cumulative Clearing Price" methodologies presented in the *ERI 2017 Report*.

This report was prepared principally by Daniel Klett, an economist with Capital Trade, Inc. Mr. Klett has participated as an economist in various trade investigations involving uranium before the U.S. International Trade Commission, including those involving uranium concentrate and low-enriched uranium. Part of Mr. Klett's responsibilities in those investigations (as well as trade investigations involving a wide variety of products) involved evaluating price effects in the market of subject imports. Mr. Klett's background is provided in Attachment 1.

II. Market Clearing Price Principles

In a competitive market, it is a well-established economic principle that the market clearing price is where demand intersects marginal cost (supply).[1] This principle is recognized in the *ERI 2017 Report* (at 44, predicting the price effects of an "incremental" change in supply associated with DOE inventory transfers, or "The market clearing price is the total cost of

[1] See *Microeconomic Theory, A Mathematical Approach*, Henderson & Quandt, Third Edition, 1980, at 86.

production for the last increment of primary supply that is required to meet demand (less secondary supply and excess inventory.") This same principle has been the basis for ERI's price forecasts in its previous reports, and is applicable to mining (U_3O_8), conversion (UF_6), and enrichment (SWU).

> "In any particular year, the market clearing price (or equilibrium price) for uranium concentrates, for example, is based on the cost of production of the last increment of uranium that must be supplied by the market in order to provide the total quantity of uranium concentrates that is demanded by the market during that year."[2]

Consistent with this market clearing price mechanism, price *changes* in a competitive market are the result of *changes* in supply (marginal cost) and/or demand. This same principle applies to price determination in other competitive markets.

III. The Role of Inventories in the Uranium Market

Inventories can affect the market price for uranium through effects on demand or supply.   Effects through demand can occur when excess inventory held by users results in less uranium being purchased than required, or when low inventory held by users results in more uranium being purchased than required.[3] The effects on price through supply relate to commercial inventories being a component of secondary supply, which also includes tails recovery, enrichment underfeeding, plutonium and uranium recycling, and DOE inventory transfers.[4] However, such supply-side effects on price occur when there are changes in any of these inventory components from sales into the market.

A key focus of the *ERI 2017 Report* (and ERI's prior reports) is estimating the effect on market prices for uranium, conversion, and enrichment of DOE inventory releases into the market. Many other supply and demand factors also would affect market prices simultaneous with any price effects of DOE inventory releases.   ERI relied on a market clearing price analysis

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[2] See Energy Resources International: i) *2014 Review of the Potential Impact of DOE Excess Uranium Inventory on the Commercial Markets* (April 25, 2014), and ii) *Analysis of the Potential Effects on the Domestic Uranium Mining, Conversion and Enrichment Industries of the Introduction of DOE Excess Uranium Inventory During CY 2015 Through 2024* (February 10, 2015), footnote 3 in both reports. This same language is repeated in the *ERI 2017 Report,* at footnote 3.

[3] See *ERI 2017 Report*, at 6-7 (demand and requirements for uranium can differ based on inventory increases or drawdowns) and 10 (actual uranium demand has exceeded requirements as end-users increased strategic inventory levels.

[4] See *ERI 2017 Report*, at 10.

that "allows the price impact of any single component such as DOE inventory, to be estimated," given its estimates of market demand, and supply (cost).[5]

In addition, ERI conducted or reported certain statistical analyses of price effects, both in the *ERI 2017 Report*,[6] and in prior reports.[7] However, without access to the underlying data as well as statistics normally supplied with the estimated results, CapTrade has no basis to evaluate the reliability of these estimates.[8]

IV. The "Annual" and "Cumulative" Clearing Price Methodologies

In its previous reviews of the price impact of DOE's excess uranium inventories, ERI relied on an annual clearing price methodology, with:

> "The change in market clearing price attributed to a particular component of secondary supply, such as DOE inventory, is found by removing the market component in question from the secondary supply. This has the effect of moving the supply curve to the left, resulting in a higher market clearing price for the same requirements."[9]

That is, in its reports prior to 2017, ERI estimated the effects on spot market prices (for uranium, conversion, and enrichment) of an annual schedule of DOE's introduction of inventory into the market. For example, Tables 3.6, 3,7, and 3.8 in the *ERI 2015 Report* are schedules of annual volumes of inventories introduced into the market affecting the uranium, conversion, and enrichment markets, respectively. ERI constructed cost curves for uranium, conversion, and enrichment, and from these calculated:

> "supply curve slopes used to determine the price effect of DOE material are $0.375 per pound U_3O_8 for each one million pound *change* in supply, $0.31 per kgU as UF_6 for each one million KgU *change* in conversion supply and $4.1 per SWU for each one million SWU *change* in enrichment supply."[10]

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[5] See *ERI 2017 Report*, at 44.
[6] See *ERI 2017 Report*, at 61-63. Note the ERI also refers to price effects estimates from an econometric analysis prepared by TradeTech.
[7] See, e.g., *ERI 2015 Report*, at 50-53.
[8] It is standard practice when reporting the estimated coefficients from econometric models to also report information relevant to statistical "confidence" in the estimates. However, no such statistics are reported in the ERI results, nor in the TradeTech econometric results referenced by ERI.
[9] See *ERI 2015 Report*, at 42. Identical/similar language is contained in earlier ERI reports. Although not characterized as an "annual" method in those earlier reports, the approach corresponds to the annual approach in the *ERI 2017 Report*.
[10] See *ERI 2015 Report*, at 44 (emphasis added).

The DOE inventories introduced into the market in each year multiplied by the supply curve slopes result in the price effects reported at *ERI 2015 Report* Tables 4.1, 4.2, and 4.3 for uranium, conversion, and enrichment, respectively.[11] These estimated price effects are described in *ERI 2015 Report* (at 44) as "year-by-year changes in clearing price attributed to the DOE material."

The *ERI 2017 Report* (at 45) describes a similar market clearing price mechanism:

> "The change in market clearing price attributed to a particular component of secondary supply, such as DOE inventory, is found by removing the market component in question from secondary supply. This has the effect of moving the intersection of demand (less secondary supply) to the right, resulting in a higher market clearing price for the same reactor requirements."

The *ERI 2017 Report* (at 49-51) includes price effects estimates using the same methodology as in its earlier reports, which it describes as the "annual" clearing price methodology. However, the *ERI 2017 Report* introduced (at 52-56) an alternative "cumulative" clearing price methodology. ERI's justification for this alternative approach is that:

> There exists an "inventory overhang" effect, whereby the release of DOE inventory "exacerbates" the volume of excess inventory from primary uranium, and the size of excess inventories affects the market clearing price.

There are serious flaws with ERI's cumulative methodology for price effect estimates. First, the market clearing principle that price equals marginal cost is violated, and is a principle widely accepted and used in the uranium market for price determination estimates, and for competitive markets generally. In its other studies, ERI has relied solely on the annual methodology, with the price effects being estimated based on the shift in the supply (cost) curve attributed to the DOE inventory introduced into the market each year, and the consequent change in the marginal cost supplier associated with a given level of demand, with an associated effect on price.[12]

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[11] The reported price effects from this calculation exactly matches those reported in Tables 4.1 and 4.2 for uranium and conversion, but are off by a small amount for enrichment. This probably is the result of the underlying data used by ERI for the enrichment price calculations were more precise (i.e., not rounded to the tenth decimal place) that reported in the tables.

[12] See, e.g., *ERI 2014 Report* at Figure 4.2, showing a shift of the supply curve to the left associated with removal of DOE inventories, resulting in a higher market clearing spot price than if DOE inventory had not be introduced into the market.

Second, regarding any "inventory overhang" effect, this might affect the timing, but not the magnitude of price effects, based on sellers' and buyers' behavior. Firms could alter their behavior in anticipation of expectations of future inventory releases or build-ups. For example, In the case of an inventory overhang, sellers may have an incentive to accelerate their own shipments into the market in anticipation of possible future price decreases if they expect future liquidation of excess inventory by their competitors. Buyers, however, may have an incentive to delay their purchases. Ultimately, however, the manifestation of any "timing" effects of an inventory overhang on the market clearing price must be sales of that inventory into the market.

Third, ERI is unclear and inconsistent with regard to when and how a particular volume of DOE inventory has an effect on market price. When sold into the market? When used by the utility? And if held in inventory by users after being sold by the DOE, what is the economic mechanism by which such inventory stock itself can have a continuing effect on the market price? For example, ERI assumed that the historical transfers of BLEU and ENW material would have a market price impact when used to produce the required nuclear fuel, not when it was sold.[13] If the DOE transfers since 2014 were treated in the same way, the impact in 2014 would be zero (as ERI assumes) as any sales were offset by production decreases or held in inventory for future sales.

Fourth, as a partial offset to the DOE inventory releases, ERI states that there has been or will be some primary mine shutdowns.[14] However, it is difficult to determine how the mine shutdown levels given by ERI were determined, or how these shutdowns were specifically factored into the cumulative methodology price effects presented in Tables 4.2 to 4.6. In fact, earlier in its report (at 45), ERI states that in an oversupplied market the removal of a particular component of secondary supply (i.e., DOE inventory) "does not result in a corresponding amount of new primary supply entering the market in its place, it instead reduces the amount of oversupply."

The ERI cumulative methodology is without a theoretical basis in economics, and is based on implicit assumptions that make no sense. For example, the cumulative method

[13] See *ERI 2017 Report*, at 24.
[14] See *ERI 2017 Report*, at 52.

assumes that DOE transfers that were sold in 2014 and presumably held in inventory by utilities and never sold again, would continue to affect the market clearing price for every year from 2014 through 2020. There is no explanation for the economic mechanism for how uranium held in inventory and not offered for sale after 2014 would continue to affect the supply and demand balance, and the market clearing price in future years. Attachment 2 shows DOE uranium releases from 2009 and projected releases through 2020. The cumulative supply increase from DOE inventory releases totals 42.5 million pounds through 2016, and 60.0 million pounds through 2020, similar to those given in the ERI 2017 Report (at 52).[15] As described, the price effect in ERI's cumulative methodology is the DOE inventory released into the market each year, plus DOE cumulative inventory releases, offset by primary production decreases (line K in the exhibit). These volumes averaged 40 million pounds annually from 2014 through 2020, compared to DOE inventories released into the market that averaged 5 million (including BLU and ENBW releases).

The ERI 2017 Report (at 52) describes its price estimates in Tables 4.4 to 4.6 as:

> "Using the cumulative methodology on a forward looking basis, the supply curves for the uranium concentrates, conversion services, and enrichment services markets have been used to determine clearing prices both with and without the DOE inventory material affecting the commercial markets."

However, how ERI arrived at the cumulative methodology price effects reported in Tables 4.4 to 4.6 is not clear based on information included in the *ERI 2017 Report*.

V. Conclusions

In its earlier studies on the effects DOE uranium inventory transfers, ERI relied on a methodology where DOE's actual annual releases into the market were used to determine the supply curve shift leading to a new equilibrium price, and its estimated price effects. The *ERI 2017 Report* also relied on this methodology for its "annual price clearing methodology" estimates of price effects of DOE inventory releases, but supplemented this with an alternative

[15] The cumulative inventory amount given by ERI from 2009 to 2016 is 39 million, and through 2020 is 61 million pounds. ERI did not provide complete backup support for how these totals were derived. While the totals given in Attachment 2 differ somewhat from those in the ERI report, this does not undermine the factual point that there is a significant difference between the volume of DOE inventory sold into the market, and the sum of that sold into the market and existing past inventories.

“cumulative price clearing methodology”. This new methodology found larger price effects by including not only inventories sold into the market by DOE each year, but also “inventory overhang” price effects associated with DOE-supplied inventories held by others. The price effect estimates using ERI’s cumulative methodology should be rejected. As explained above, there is no basis in economics why a specific volume of DOE releases sold into the market in year X, which clearly have price effects in that year based on standard economic theory, will continue to have price effects in all later years based on being held in inventory. ERI has not explained the mechanism for how this would occur, other than a general reference to “inventory overhang” effects. In fact, taken to its logical conclusion, and its recognition that uranium markets are global in nature (*ERI 2017 Report*, at 46), the size of *cumulative* excess uranium inventory stocks from all sources worldwide also would affect market prices, according to ERI’s theory. Attachment 3 includes data from 2009 to 2020 on worldwide reactor requirements, primary supply, and secondary supply. As shown, extending ERI’s cumulative methodology to include all inventories and other sources of secondary supply would result in cumulative excess supply *exceeding* demand (reactor requirements) for each year from 2017 to 2020. This relationship would result in unreasonably dire forecasts for these years of uranium prices approaching zero.

For all of the above reasons, the DOE should continue to rely on its annual methodology for estimating the price effects of DOE inventory releases.

Attachment 1

CAPITAL ★ TRADE
INCORPORATED

DANIEL W. KLETT

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EDUCATION

1985, M.A., Economics, Georgetown University
1976, B.A., Economics, College of the Holy Cross

EXPERIENCE

Mr. Klett is a principal with Capital Trade, Incorporated. His background is in international economics and trade regulation, with specific expertise in assessing the economic impact of imports on U.S. industries and consumers. He has participated in studies involving U.S. export control regulations, direct foreign investment in the United States, financial analysis of the member companies of an international consortium, and economic effects of trade policy decisions.

International Economic Analysis

Mr. Klett's experience in economic analysis of international trade issues includes:

- Analysis of impact of imports on competing U.S. industry, including use of existing economic models, econometric analysis of time series data, and testimony
- Estimation of impact of trade restrictions on consumers
- Economic analysis and expert testimony in USITC Section 337 investigations, including domestic industry, gray market issues, downstream remedy, and circumvention
- Statistical analysis to support arguments made to the Department of Commerce in antidumping investigations
- Trade policy analysis for foreign governments.

Case Experience - U.S. International Trade Commission

- Framing Stock from the UK
- Softwood Lumber from Canada
- Uranium Concentrate
- Flat Panel Displays from Japan
- Cement
- Industrial Nitrocellulose
- Silicon Metal from Brazil
- Aspheric Ophthalmoscopy Lenses from Japan
- Honey from China
- Pencils from China
- Bulk Diltiazem (Section 337)
- Polyvinyl Alcohol (Japan, Korea, Taiwan, PRC)

Case Experience - U.S. International Trade Commission (cont.)

- Salinomycin Biomass (Section 337)
- Rebar from Turkey
- Pasta from Italy and Turkey
- Stainless Steel Wire Rod
- Wheat Gluten (Section 201)
- EEPROMs (Section 337)
- Titanium Sponge (Changed Circumstance Review)
- Cut-to-Length Carbon Steel Plate
- Ferrosilicon (Changed Circumstance Review)
- Roller Chains from Japan (Sunset Review)
- Color Picture Tubes (Sunset Review)
- Silicon Metal (Sunset Review)
- Various carbon and stainless steel products
- Table Grapes from Chile
- Steel Wire Rope
- Ammonium Nitrate (Investigation and Sunset Reviews)
- Urea (Investigation and Sunset Reviews)
- Large Diameter Line Pipe
- Oil Country Tubular Goods from various countries
- Low Enriched Uranium
- DRAMs from Korea
- Outboard Engines from Japan
- Potassium Permanganate (Sunset Reviews)
- Carboxymethylcellulose from various countries
- Diamond Sawblades from Korea and China
- Liquid Sulfur Dioxide from Canada
- Artists' Canvas from China
- Certain Automated Mechanical Transmission Systems (Section 337)
- Diamond Sawblades from China and Korea
- Coated Freesheet from Korea, China, and Indonesia
- Certain DRAM Devices and Products Containing Same (Section 337)
- Innersprings from China, South Africa & Vietnam
- Hydraulic Excavators (Section 337)
- Off-Road Tires from China
- Dynamic Random Access Memory Devices and Products (Section 337)
- Semiconductor Devices, DMA Systems, and Products (Section 337)
- Certain Coated Paper from China and Indonesia
- Certain Sodium and Potassium Phosphate Salts from China
- Digital Televisions (Section 337 Enforcement Proceeding)
- Glyphosate from China
- Certain Coated Paper from China

Case Experience - U.S. International Trade Commission (cont.)

- Fresh & Chilled Atlantic Salmon from Norway (sunset)
- Large Power Transformers from Korea
- Bottom Mount Refrigerators from Korea
- Large Residential Washers from Korea
- Ferrovanadium from Russia (sunset)
- Ferrosilicon from Venezuela
- Silica Bricks from China
- Chlorinated Isocyanurates from Japan
- Stainless Steel Bars (Section 337)
- Carbon Steel Flanges from India, Italy, and Spain
- Carbon Steel Nails (multiple countries)

Case Experience - U.S. Department of Commerce

- Industrial Nitrocellulose from Seven Countries
- Atlantic Salmon from Norway
- Kiwifruit from New Zealand
- Man-Made Fiber Sweaters from Korea
- Potassium Permanganate from Spain and China
- Aspheric Ophthalmoscopy Lenses from Japan
- Flat-Rolled Carbon Steel Products from various countries
- Stainless Steel Bar from India
- Urea Ammonium Nitrate from Russia, Ukraine, & Belarus
- Grapes from Chile
- Frozen Shrimp from Multiple Countries
- Sebacic Acid from China (changed circumstance review)
- China wage calculations

Other Projects

Mr. Klett has participated in other international trade-related projects, including:

- Consumer cost study for Japanese semiconductor companies in EU antidumping proceeding.
- Analysis of the impact of U.S. national security export controls on the international business strategies of U.S. high-technology companies.
- Assistance to a Swiss manufacturer in assessing the feasibility of setting up manufacturing facilities in the United States, and site location.
- Analysis of the financial condition of Airbus members, in the context of state support and commercial conditions.
- Section 301 investigation--modified wheat starch from the EU (on behalf of EU grain industry).
- Jamaica escape clause (Safeguards) investigation involving cement.
- Analysis of trade flows to assist company in assessment of acquisition.

Other Projects (cont.)

- Economic analysis of trade flows for Chilean table grape producers involved in proposed marketing order change.
- Analysis for the UAE Embassy of US/UAE trade flows on the U.S. economy and U.S. states, sectors, and companies.
- Analysis for the Saudi Arabia Government of policy changes relating to diversification of the economy, foreign direct investment, and effects of FTAs.
- Economic effects of the TPP related to athletic footwear (with Andrew Szamosszegi)

Prior Experience:

Prior to forming Capital Trade, Incorporated, Mr. Klett was a Vice President with ICF Consulting Associates (1990-92), and a supervisor at Coopers & Lybrand (1987-90).

From 1979 to 1987, Mr. Klett was an economist at the U.S. International Trade Commission, first in the Office of Economics (1979-1986) and then as the economic advisor to four Administrative Law Judges (1986-1987). In the Office of Economics, Mr. Klett prepared analysis relating to anti-dumping and escape-clause (safeguard) proceedings.

From 1977 to 1979, Mr. Klett served as a Peace Corps volunteer in Sierra Leone, teaching economics at the high school junior to introductory university levels.

PROFESSIONAL AFFILIATIONS

American Economic Association

PUBLICATIONS AND CONFERENCES

"The U.S. Tariff Act, Section 337: Off-Shore Assembly and the Domestic Industry," Journal of World Trade Law, May-June 1986.

"Price Sensitivity and ITC Injury Determinations: A Matter of Definition," (with T. Schneider) Journal of World Trade, April 1994.

"Proposed Changes Concerning Import Duties and Domestic Indirect Tax Rebates--Conformity to the GATT, and Benefits to the Peruvian Export Sector," Presented at Foro Internacional Sobre Devolucion de Impuestos y Drawback a Las Exportaciones, Lima, Peru, August, 1994.

Presentations to various China, Korea and Vietnam Trade Delegations relating to role of economists in International Trade Commission proceedings. Sponsored by the International Law Institute.

Presentation to Kosovar Trade Delegation on the role of economists in international trade proceedings.

Panel member for Georgetown Continuing Education Seminar, "Practical 'How-to' Advice for Injury Investigations in Trade Remedy Cases."

Attachment 2

Historical and Projected DOE Inventory Releases into the Market

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
EM Transfers MTU as UF6 (A)	202	921	1,600	1,601	2,400	2,055	2,000	1,600	1,600	1,600	1,569	559	17,707
NNSA Transfer MTU as UF6 (B)	250	500	550	318	627	650	534	450	500	500	452	-64	5,267
Total MTU (C = A + B)	452	1,421	2,150	1,919	3,027	2,705	2,534	2,050	2,100	2,100	2,021	495	22,974
Total MM lbs. sold from DOE (D = C * 2.613)	1,181	3,713	5,618	5,014	7,910	7,068	6,621	5,357	5,487	5,487	5,281	1,293	60,031
Cumulative Total Pounds Sold (E)	1,181	4,894	10,512	15,526	23,436	30,504	37,126	42,482	47,969	53,457	58,738	60,031	
Cumulative Total Minus Production Decrease Offset mmlbls. (F = E - H)						27,504	31,126	33,482	35,469	37,457	39,238	37,031	
Offset by Production Decreases (G) 1/	0	0	0	0	0	3,000	3,000	3,000	3,500	3,500	3,500	3,500	23,000
Cumulative Offset (H)	0	0	0	0	0	3,000	6,000	9,000	12,500	16,000	19,500	23,000	

Sources:

2009 to 2010 EM Transfers from GAO-11-846 Table 3

2009 to 2011 NNSA Transfers information is estimated from Figure 3.1 of the ERI 2017 Report

2011 EM Transfers from DOE Excess Uranium Inventory Management Plan at 17

2012 and 2013 from ERI 2015 Report, Table 3.2.

2014 to 2020 from ERI 2017 Report, Table 3.2.

1/ Based on ERI 2017 Report (at 52), stating that DOE inventory releases would have displaced U.S. mining production by 9 million pounds in 2014-2016, and by 23 million pounds by 2020. ERI is not clear as to whether the 23 million pound decrease is inclusive or exclusive of the reported production decline in 2014-16, and for purposes of this table it is assumed to be inclusive.

Attachment 3

EXCESS WORLD SUPPLY 2010-2020
(million lbs U3O8)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Reactor requirements	**188.3**	**210.5**	**140.9**	**140.3**	**146.7**	**156.8**	**158.8**	**160.1**	**174.6**	**169.7**	**181.0**	**182.2**
Historical primary production	133.5	142.4	140.1	152.1	156.4	147.4	155.7	165.8	---	---	---	---
Projected primary supply capability:												
Operating	---	---	---	---	---	---	---	---	164.7	174.4	176.8	177.4
Under construction	---	---	---	---	---	---	---	---	0.7	0.6	0.7	0.7
Total primary supply	*133.5*	*142.4*	*140.1*	*152.1*	*156.4*	*147.4*	*155.7*	*165.8*	*165.4*	*175.0*	*177.6*	**178.1**
Total secondary supply	*17.0*	*39.3*	*47.1*	*38.7*	*46.3*	*21.7*	*28.6*	*32.0*	*36.7*	*39.6*	*39.4*	*35.7*
Total supply	**150.5**	**181.7**	**187.2**	**190.8**	**202.7**	**169.1**	**184.3**	**197.8**	**202.1**	**214.5**	**217.0**	**213.8**
Excess supply, Annual	**-37.8**	**-28.7**	**46.3**	**50.5**	**56.1**	**12.2**	**25.5**	**37.7**	**27.5**	**44.9**	**36.0**	**31.6**
Cumulative excess supply	-37.8	-66.5	-20.2	30.3	86.3	98.6	124.1	161.7	189.2	234.1	270.1	301.7
Reduction in Production Due to DOE 1/						3	6	9	12.5	16	19.5	23
Net cumulative excess supply						95.6	118.1	152.7	**176.7**	**218.1**	**250.6**	**278.7**

Exceeds demand for each year from 2017 to 2020

1/ See Attachment 2.