



## URANIUM PRODUCERS OF AMERICA

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September 19, 2016

Cheryl Moss Herman  
U.S. Department of Energy  
Office of Nuclear Energy  
Mailstop NE-52  
19901 Germantown Road  
Germantown, MD 20874-1290

Sent via email: RFI-UraniumTransfers@hq.doe.gov

Re: UPA Response to DOE RFI; Excess Uranium Management: Effects of  
DOE Transfers of Excess Uranium on Domestic Uranium Mining,  
Conversion, and Enrichment Industries (81 Fed. Reg. 469170)

Dear Ms. Herman:

On behalf of the Uranium Producers of America (UPA), a national trade association representing the domestic uranium and conversion industry, we appreciate the opportunity to provide input regarding the Department's management of the federal excess uranium inventory. That said, we remain concerned the Secretarial Determination process is not transparent and any additional transfers, until market conditions recover, will continue to have an adverse material impact on our industries. The current Secretarial Determination process is not transparent and causes significant uncertainty in the market regarding the quantity and price at which DOE will transfer the government's excess uranium.

### **Defining "Adverse Material Impact"**

The results of the *ConverDyn* litigation require a change in the method that DOE has relied upon in making its determinations of "adverse material impact". DOE's practice of balancing the benefits of its barter transfers to programs against the adverse impact of such transfers to the domestic fuel industry was found to be in violation of Section 2297h-10(d) of the USEC Privatization Act. DOE has improperly asserted that "the meaning of the phrase is likely to depend in part on the factual context in which it is to be applied." DOE's reliance on its "driver" definition of material adverse impact was held to be arbitrary and capricious in the Court's review of the 2014 Secretarial Determination.

Before addressing the specific questions included in the RFI, we want to highlight this more fundamental issue DOE has failed to address – defining “adverse material impact.” Under the USEC Privatization Act (P.L. 104-134), before making any uranium transfers, the Department must certify proposed transfers will not have “an adverse material impact on the domestic uranium mining, conversion, or enrichment industry.” Prior to the most recent Secretarial Determination (May 2015), the DOE made this decision without any public input. While UPA commends DOE for issuing the RFI and asking for public input, the Secretarial Determination process will remain arbitrary until the DOE defines “adverse material impact.” Without a clear definition of the phrase’s meaning, the DOE has no yardstick to measure the effect of barter transactions on the uranium markets.

While there are likely several ways to define “adverse material impact,” the most straightforward approach is to compare the value of the uranium being transferred to the average cost to produce uranium in the United States. Simply put, DOE should define adverse material impact as any proposed uranium transfer where the value of the uranium at the time of the transfer (as measured by the spot price) is below the average cost of producing uranium in the U.S. According to the U.S. Energy Information Administration (EIA), the average total cost for U.S. uranium production was \$66.86 per pound in 2015.<sup>1</sup> The average total cost includes exploration, production, restoration, land, plant capital, wellfield capital, regulatory permitting, etc. EIA estimates average production (“cash”) costs at \$35.44 per pound.

**With the current uranium spot price at \$24.75 (TradeTech as of September 16, 2016), DOE should halt any additional transfers in 2016 and postpone all future transfers until the market price recovers.**

Concerning future transfers UPA recommends:

- DOE stop all transfers when the spot market price is below the EIA’s reported production cost (currently \$35.44 per pound) plus a modest margin (e.g. 10 percent).
- DOE severely limit transfers when the spot price is below the average total cost (currently \$66.86 per pound).
- Under no circumstance should DOE transfer more uranium than the U.S. uranium industry is producing.
- When the spot market price recovers to levels above the average total cost with a modest margin, DOE should limit transfers to no greater than 10 percent of the total annual U.S. reactor requirements, consistent with DOE’s 2008 uranium management plan.

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<sup>1</sup> U.S. Energy Information Administration 2015 Domestic Uranium Production Report published May 2016 (\$223.5 M Total Expenditures in Table 8 / Total Uranium Concentrate Production @ 3.343 M pounds in Table 3).

- DOE should seek to maximize taxpayer value for this asset, including halting transfers when market prices are low.

For context, in 2015 and 2016, the total amount of DOE uranium impacting the market, including the TVA BLEU material, approaches 14.2 million pounds.<sup>2</sup> Over this timeframe, this amount of DOE material is more than double U.S. production and is also well above 10 percent of U.S. 2015 and 2016 reactor requirements.

### **Providing Transparency on Inventory and Developing New Management Plan**

Before issuing another Secretarial Determination, UPA encourages the Department to make additional information publicly available about the excess uranium inventory, including the amount and type of material that remains in inventory and any plans to declare additional material to be excess to national security needs.

UPA also reiterates our call for the Department to update its inventory management plan, including reforming how the material enters the market. For the last several years, UPA has urged DOE to consider working with the industry to sell the DOE material through stakeholder long-term contracts, which would lessen the impact on the industry and provide taxpayers better value for this asset. Unfortunately, DOE never responded. We encourage DOE to engage the key stakeholders to identify ideas to lessen the impact of future DOE uranium transfers on the domestic uranium and conversion industries.

DOE and the National Nuclear Security Agency (NNSA) should also consider revising the current practice of downblending High Enriched Uranium (HEU) to commercial grade Low Enriched Uranium (LEU) below 5 percent U-235. Instead, DOE-NNSA should be downblending HEU to levels between 5-19.75 percent LEU for research and advanced reactor fuel. This would be supportive of U.S. non-proliferation policy as well as eliminate the adverse material impact the uranium, conversion and enrichment components contained in the DOE LEU below 5 percent is having on the commercial market.

In the July 2013 DOE Excess Uranium Inventory Management Plan (2013 Plan), DOE stated it “is committed to managing excess inventories in a manner that is consistent with and supportive of the maintenance of a strong domestic uranium industry.” It is evident the domestic uranium industry has not been maintained with production dropping 30 percent from 4.7 M pounds in 2013 to 3.3 M pounds in 2015 with a further drop expected in 2016.<sup>3</sup> Drilling is the harbinger metric for the uranium industry maintenance and growth, and has dropped over 70 percent from 3.9 M feet in 2013 to 0.9 M feet in 2015.<sup>4</sup>

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<sup>2</sup> UxC Uranium Market Outlook 2016 Q3, Table B-15

<sup>3</sup> EIA 2015 Domestic Uranium Production Report published May 2016 - Table 3. - U.S. uranium concentrate production, shipments, and sales, 2003 - 15, Total Uranium Concentrate Production

<sup>4</sup> EIA 2015 Domestic Uranium Production Report published May 2016 - Table 1. U.S. uranium drilling activities, 2003 - 15, Exploration and Development Drilling

It is clear the domestic industry is struggling to survive. As the UPA has expressed in previous correspondence, we ask DOE to honor their commitment in the 2013 Plan and halt further transfers until such time as the markets recover.

### **UPA Response to RFI Questions**

In order to provide the Department with a detailed assessment of the impact of uranium transfers on the domestic industry, UPA commissioned TradeTech, a leading uranium market analyst, to conduct a study on the impact of DOE Uranium transfers. While we have cited some of the highlights below, UPA is submitting the full study as part of our formal response to the RFI.

#### **(1) What are current and projected conditions in the uranium markets and the domestic uranium mining, conversion, and enrichment industries?**

As noted above, the uranium and conversion industries are struggling to survive. The spot price on September 16, 2016 dropped to \$24.75 per pound U<sub>3</sub>O<sub>8</sub> (TradeTech), the lowest price seen since 2005. Long-term prices have been impacted as well, dropping from \$70 to \$38 per pound U<sub>3</sub>O<sub>8</sub>. The uranium and conversion markets continue to suffer with persistent oversupply from price insensitive sources and limited uncommitted demand. In response to these adverse market conditions, the U.S. industry has lost about half of its workforce since 2012 and halted production at various mine sites. As reported by the EIA, domestic uranium production has declined by 32 percent between 2014 and 2015.<sup>5</sup>

The trend of industry contraction continues. For the first half of 2016, U.S. uranium concentrate production totaled 1,372,828 pounds U<sub>3</sub>O<sub>8</sub>. This amount is 29 percent lower than the 1,944,388 pounds produced during the first half of 2015.<sup>6</sup> The largest producer in the U.S., Cameco, recently announced plans to halt U.S. production until the market recovers.

TradeTech notes:

*“Suppliers in today’s uranium market face significant challenges, including oversupply, discretionary demand, reduced contractual coverage among buyers, and a heightened risk profile in the capital markets.”*

*“Declining uranium producer profit margins further reflect the circumstances that have defined the domestic uranium industry in the post-Fukushima period. In recent years, many uranium producers have interpreted persistently low spot prices, declining realized prices, low liquidity, and reduced appetite for term*

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<sup>5</sup> EIA 2015 Domestic Uranium Production Report published May 2016 – Page 1 “Total production of U.S. uranium concentrate in 2015 was 3.3 million pounds U<sub>3</sub>O<sub>8</sub>, 32% less than in 2014”

<sup>6</sup> U.S. Energy Information Administration - Domestic Uranium Production Report 2nd Quarter 2016, published August 2016 – Table 1. Total production of uranium concentrate in the United States, 1996 – 2nd Quarter 2016

*contracting among buyers as significant market signals and have consequently reduced, deferred, or mothballed production. Price-insulated, price-insensitive, and politically strategic supply sources are not responsive to such signals and continue to flow into the market, postponing a potential market recovery.”*

*“these factors combined have placed sustained downward pressure on uranium prices, the adverse material effect of which has been net losses totaling over \$105 million dollars for US uranium producers with active domestic uranium production centers in the USA in 2015.”*

The effects of the current market conditions and DOE transfers will be magnified as legacy contracts at higher prices continue to expire. We are on the verge of a national security crisis when it comes to ensuring we have a stable indigenous supply of uranium for U.S. reactors. The U.S. now imports about 93 percent of the uranium needed to fuel domestic nuclear reactors.

**(2) What market effects and industry consequences could DOE expect from continued transfers at annual rates comparable to the transfers described in the 2015 Secretarial Determination?**

According to the analysis conducted by TradeTech, DOE transfers have had a cumulative impact of \$16.95 per pound over the 2012-2015 time frame. The annual impact has increased each year with an average spot price reduction of \$4.24 per pound per year. In 2015, despite a lower transfer rate, Trade Tech calculated the drop in spot price attributable to DOE transfers at \$6.14 per pound, a 47.6 percent increase above the 2014 median impact. Over the 2012-2015 period, the annual price drop attributable to DOE transfers has increased an average of about 31.3 percent per year (see TradeTech Figure 3 – Median Impact).

If transfers continue over the next three years at TradeTech’s 2015 median impact of \$6.14 per pound, the cumulative impact on uranium producers is calculated at \$35.37 per pound over the 2012-2018 period. However, if the annual rate of impact continues to increase at the 31.3 percent average annual rate evident over the 2012-2015 period, the total cumulative impact will reach \$49.64 per pound. By any measure, these are clearly adverse material impacts.

TradeTech noted:

*“Over the last six months, the long-run uranium spot price decline has gained momentum. This has served to highlight the fact that while a marginal spot price reduction that can be linked to a specific cause may not appear to be especially impactful in the short-run, there appears to be a compounding accelerating effect when none of the factors abate for an extended period of time.”*

TradeTech concludes additional DOE transfers will continue to have a “measurable adverse material impact” on uranium market prices and producers. This is not a

surprising conclusion, particularly when DOE is transferring uranium at a value below average U.S. production costs.

**(3) Would transfers at a lower annual rate or a higher annual rate significantly change these effects and, if so, how?**

Any transfers in the current market environment are very detrimental. Higher rates of transfers would be devastating. As discussed above, market conditions have deteriorated considerably since DOE issued its last Secretarial Determination in May 2015. While a lower annual rate of transfers would certainly be an improvement, UPA reiterates our call for DOE to suspend further transfers until the markets can recover.

The question as to whether DOE is receiving fair market value for its uranium inventory transfers was left unanswered by the Court in the *ConverDyn* litigation. DOE transfers in these market conditions are wasting a valuable taxpayer resource and are causing serious harm to a vital domestic industry.

DOE is statutorily required to ensure its transfers are not having an adverse material impact on the domestic industry. Before examining the impact of higher or lower rates of transfers, DOE must define what constitutes an adverse material impact. DOE's failure to articulate a clear metric has left UPA to conclude that DOE's decisions are driven by the level of funding needed to maintain the pace of the cleanup projects as opposed to the impact the transfers are having on the domestic uranium mining, conversion, and enrichment industries. TradeTech's concluding remarks in its report summarize the situation well:

*“Looking to the future, TradeTech’s models indicate that DOE material transfers entering the spot uranium will continue to have a measurable adverse material impact on uranium market prices and, by extension, uranium producers. If DOE were to completely cease material transfers, then producers would see improvement in the market.”*

**(4) Are there any anticipated changes in these markets that may significantly change how DOE transfers affect the domestic uranium industry?**

The challenges facing the domestic uranium industry are expected to worsen with DOE price insensitive uranium continuing to impact the market and limited uncommitted demand to absorb it. We expect market prices to remain under pressure until the market returns to a production driven, instead of an inventory driven, market. As more reactors go offline and higher priced long-term legacy contracts expire, conditions will continue to deteriorate for the industry.

EIA data shows a 40 percent increase (34.5 M pounds) in U.S. utility inventory from 86.5 M pounds U3O8 equivalent at EOY 2010 to 121 M pounds at the end of 2015.<sup>7</sup> TradeTech information from the Euratom Supply Agency revealed an increase of 17 M

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<sup>7</sup> U.S. EIA 2015 and 2014 Uranium Marketing Annual Report – Table 23

pounds over the same period. In total, this is a 51.5 M pound increase in utility inventories. DOE material impacting the market over the same period totals 39.1 M pounds.<sup>8</sup> Clearly, it's not a stretch to conclude much of the inventory increase is a direct result of DOE's material. The inventory will need to be absorbed into reactor requirement schedules before a market recovery has a reasonable chance to materialize.

The balance of DOE transfers for the 3<sup>rd</sup> and 4<sup>th</sup> quarter in 2016 are approximately 1300 MTU (3.4 M pounds) and completely overwhelm both the U.S. and the non-U.S. uncommitted utility demand of only 0.3 M pounds for the remainder of 2016.<sup>9</sup> In essence, DOE price insensitive material effectively consumes any available market for domestic producers. As long as the uncommitted demand in the uranium market is unable to absorb DOE price insensitive supply along with other material for sale, prices will continue to be severely impacted.

Knowing there is excess price insensitive material entering the market, the trading community will often sell material for future delivery periods below the existing spot price or forward price curve in order to entice a utility to purchase material they do not need in the near term. This translates into pricing pressure across the entire uranium market enabling acquisition at lower prices, often at later dates. In these cases, the excess supply is absorbed primarily by the trading community that then finances the material for forward sales. As a result, this delays the prospects for a price recovery by "stealing" future uncommitted demand that would otherwise be available in upcoming years. Halting DOE price insensitive material entry into the fuel markets would be immensely constructive for the U.S. uranium and conversion markets. As opposed to current methods, working with the stakeholders to help craft a more market friendly plan for disposition of DOE's excess inventory would yield better economics for the taxpayer and DOE, as well as the uranium and conversion industries.

In the early to mid-2020s, the prospects for a market recovery appears to have strong potential. The level of uncommitted demand is large enough to absorb supply from producers, as well as excess inventory anticipated from DOE without the extreme price pressure resulting from DOE's current disposition methods. The macro supply-demand picture is projected to improve in this time frame, with aggregate forces showing characteristics more favorable to absorb excess DOE inventory. This of course is partly dependent on a halt of DOE material being dumped into the market between now and then. We suggest DOE take note of these market dynamics and work with the stakeholders to help manage the United States' excess uranium and conversion inventories.

## **Conclusion**

DOE has failed in previous Secretarial Determinations to recognize the importance of the domestic uranium industry to our nation's energy security and independence. Congress enacted Section 2297h-10(d) in order to ensure the disposition of the government's

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<sup>8</sup> UxC Uranium Market Outlook Q3 2016 and Q4 2013 – Table B-15

<sup>9</sup> UxC Uranium Market Outlook 2016 Q3, Table B-10

excess uranium inventories would not adversely impact the domestic fuel industry. In past Determinations, DOE has valued the programs that benefit from its barter transactions more than the health of the domestic uranium producers. This action has been called into question by the Court, and DOE must now consider implementing an objective method by which to conduct its determinations. While it is unfortunate that the revenues from DOE's barter transactions may not be available using such a test, DOE, like the domestic industry, must recognize the market realities in which domestic companies are struggling to survive.

In sum, the UPA urges DOE to halt transfers until the market recovers. We also encourage DOE to define adverse material impact before proceeding with another Secretarial Determination and work with industry to develop a more market friendly plan for the future disposition of DOE's excess inventory.

Sincerely,

A handwritten signature in black ink that reads "Harry L. Anthony". The signature is written in a cursive style with a small flourish at the end.

Harry L. Anthony  
President



UPA

DOE REQUEST FOR  
INFORMATION  
RESPONSE

2016

# N O T I C E

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## INTRODUCTION

The following analysis is provided by TradeTech, LLC at the request of the Uranium Producers of America (UPA) at it relates to the US Department of Energy (DOE) Office of Nuclear Energy's Request for Information (RFI) on July 15, 2016. DOE has requested comments and information as it prepares for the potential issue of a new Secretarial Determination<sup>1</sup> covering transfers of uranium for cleanup services at the Portsmouth Gaseous Diffusion Plant in Ohio and for downblending of highly enriched uranium (HEU) to low-enriched uranium (LEU) to support national security objectives.

The RFI solicits information from the public about the uranium markets and US uranium industries, and the potential effect(s) of DOE transfers into the uranium markets and possible consequence(s) for the US nuclear fuel cycle industries, including uranium mining, conversion, and enrichment businesses. The information received by DOE will partially inform its analysis to determine whether its transfers would have an "adverse material impact" on the US uranium mining, conversion, or enrichment industries.

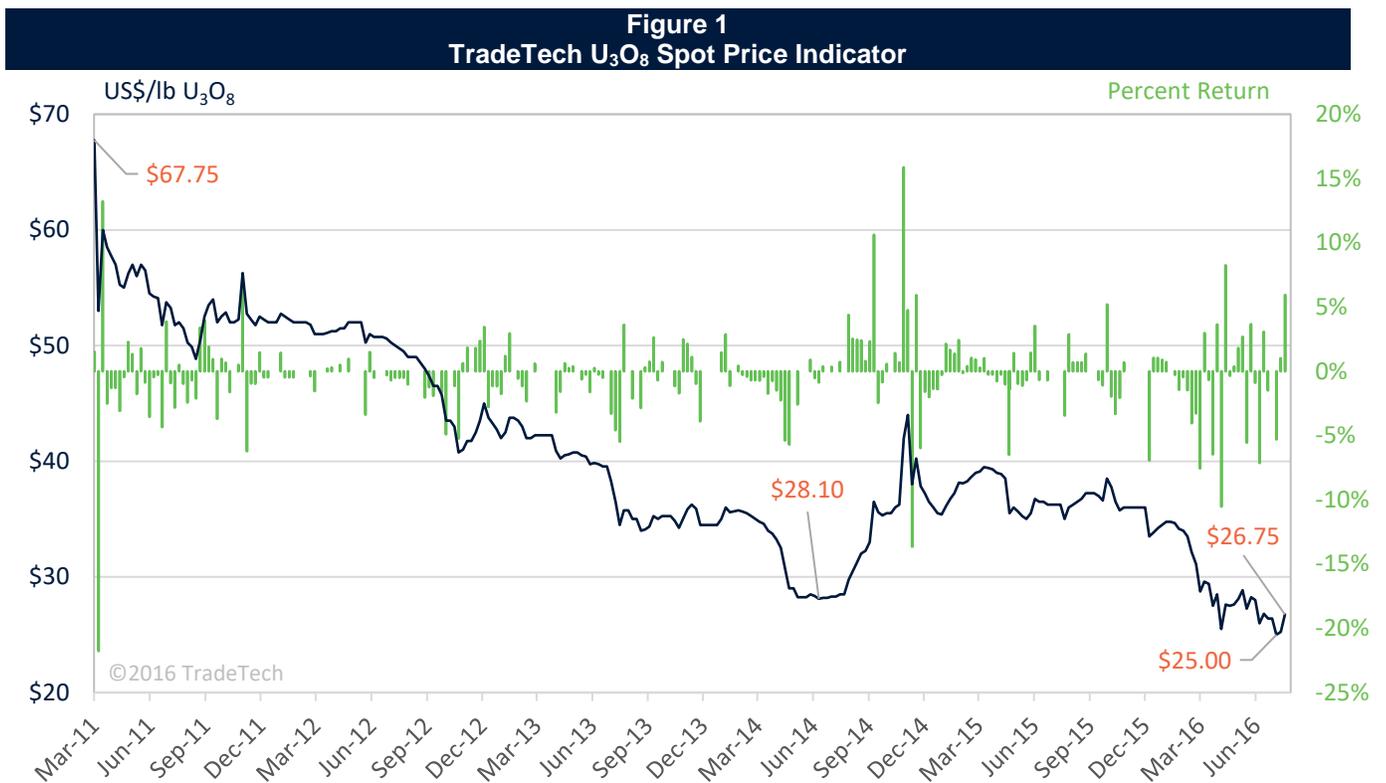
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<sup>1</sup> The most recent Secretarial Determination was issued by US Secretary of Energy Ernest Moniz on May 1, 2015, and like previous determinations, determined that continued uranium transfers for cleanup services at the Portsmouth Gaseous Diffusion Plant and for downblending of highly enriched uranium to low-enriched uranium will not have an adverse material impact on the domestic uranium mining, conversion, or enrichment industries ("2015 Secretarial Determination"). However, the latest Secretarial Determination supports lower rates of uranium transfers in the near term; it supersedes the previous determination issued in May 2014, which covered transfers for these two programs of up to the equivalent of 2,705 MTU (~7 million pounds U<sub>3</sub>O<sub>8</sub>) per year. Previous DOE policy statements indicated that the introduction into the US market of uranium from Departmental inventories in amounts that do not exceed 10 percent of domestic demand in any one-year period should not have an adverse material impact on the domestic uranium industry.

## ADVERSE MATERIAL IMPACT

Suppliers in today's uranium market face significant challenges, including oversupply, discretionary demand, reduced contractual coverage among buyers, and a heightened risk profile in the capital markets.

Fundamentally, persistent oversupply in the post-Fukushima period (post-March 2011) has led to periods of low liquidity and low volatility, which have manifested as downward price pressure as shown in **Figure 1**. The uranium spot price, perhaps the most salient indicator of the uranium market's current state, has declined more than 60 percent since the Fukushima accident in 2011. The average weekly return on the uranium spot price since March 11, 2011 has been -0.28 percent and, has declined 60.5 percent over that period. The July 15, 2016 price of US\$25.00 per pound U<sub>3</sub>O<sub>8</sub> was the lowest in over 11 years.



Historically low uranium prices have resulted in deferred production and industry contraction and consolidation. Recently, in the USA:

- US domestic uranium concentrate production declined 32 percent between 2014 and 2015;
- Cameco announced plans to curtail its US production; and
- US uranium producer realized prices fell for the third year in a row, declining 26 percent overall since 2012.
- Total US uranium production fell to 1.4 million pounds in the first half of 2016, a 29 percent decrease compared to the same period in 2015, according to the US Energy Information Administration (EIA); *Uranium Production Report 2nd Quarter 2016*.

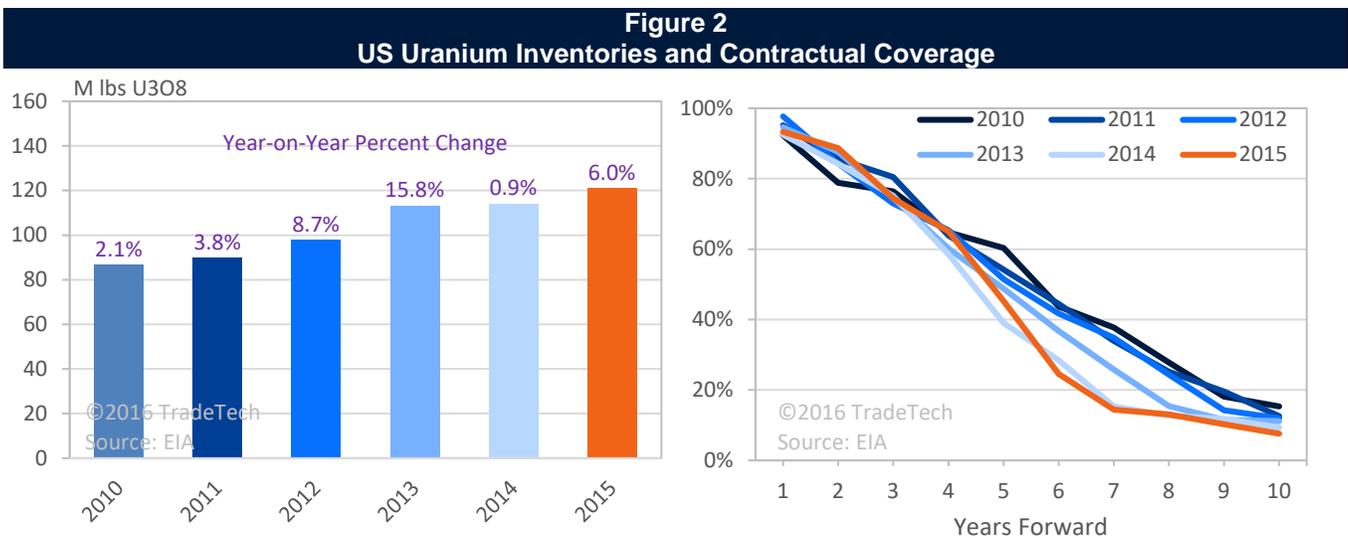
On the demand side, four additional reactors in the USA have been identified for early decommissioning, bringing the total number of premature US reactor unit shutdowns to 12. Forecasts indicate decreased uranium requirements in the long term for Japan, stagnant US requirements, and decreased requirements in select European nations. Emerging Chinese uranium demand is not necessarily driven by reactor requirements, but is seemingly strategic in nature and, therefore, presents a downside demand risk to the market should its current rate of procurement suddenly decrease.

### US Uranium Market Trends

According to the EIA, in 2015 owners and operators of US civilian nuclear power reactors took delivery of 57.0 million pounds U<sub>3</sub>O<sub>8</sub>e (including 54.5 million pounds U<sub>3</sub>O<sub>8</sub>e in spot and term contracts) from US and foreign suppliers last year. In 2015, 21 percent of U<sub>3</sub>O<sub>8</sub>e was purchased under spot contracts at a weighted average price of \$36.80 per pound. While utility purchases rose marginally from 53.0 million pounds purchased a year earlier, the weighted-average price for purchases fell nine percent to \$43.86 compared with the 2014 price of \$48.11.

EIA data show that, in 2015, owners and operators of US civilian nuclear power reactors held 121 million pounds U<sub>3</sub>O<sub>8</sub>, 40 percent higher than the 2010 total of 86.5 million pounds U<sub>3</sub>O<sub>8</sub> (**Figure 2**). Inventories are comprised of material at various stages of the front end of the fuel cycle and, within the USA, equate to over two and one-half years' worth of fuel coverage for a given US utility's estimated 2016 requirements. In comparison, utilities in the European Union (EU) held approximately 134.9 million pounds U<sub>3</sub>O<sub>8</sub> (or three years' gross requirements) at the end of 2015, 14 percent higher than the 117.9 million pounds U<sub>3</sub>O<sub>8</sub> held in inventory in 2010, according to Euratom Supply Agency data.

Consonant to this increase, a decrease in contractual coverage has materialized. In 2015, US aggregate contractual coverage equated to a coverage rate of 93 percent in 2016 for natural uranium, declining to 45 percent in 2020, then to just 8 percent by 2025. In 2010, those rates of coverage were 92, 60, and 15 percent for equivalent years forward.



### *Impact on margins*

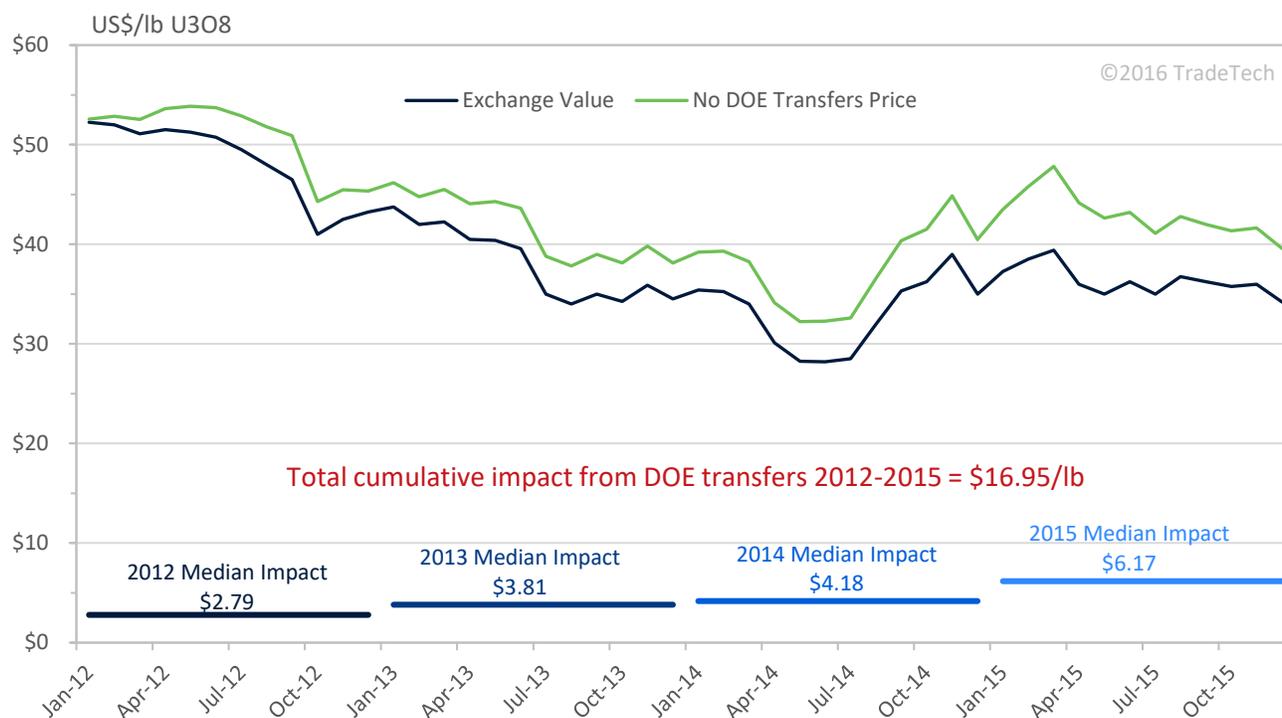
Notably, according to EIA, just six percent of purchases were of US-origin uranium in 2015, at a weighted-average price of \$43.86 per pound, five percent below the weighted-average price for all purchases. This decline is part of a larger-term trend in realized prices, and is expected to continue as legacy contracts signed over the last 10 years are fulfilled and fall out of portfolios. Declining uranium producer profit margins further reflect the circumstances that have defined the domestic uranium industry in the post-Fukushima period. In recent years, many uranium producers have interpreted persistently low spot prices, declining realized prices, low liquidity, and reduced appetite for term contracting among buyers as significant market signals and have consequently reduced, deferred, or mothballed production. Price-insulated, price-insensitive, and politically strategic supply sources are not responsive to such signals and continue to flow into the market, postponing a potential market recovery.

US Department of Energy (DOE) uranium transfers represent a key source of this material, amounting to approximately 44.6 million pounds  $U_3O_8$  moved into the commercial market since 2008 under various Secretarial Determinations relating to the Department's *Excess Uranium Inventory Management Plan*. DOE excess material transfers have amounted to 37.3 million pounds  $U_3O_8$  over the April 2011-July 2016 period.

In 2015, the oversupply condition intensified with supply exceeding demand, on average, by 1.5 million pounds per month or over 18 million pounds for the year. Global utility spot purchases amounted to just 11 million pounds  $U_3O_8$  in 2015, which, in light of increased inventories in the USA, EU, and Asian markets, indicates discretionary buying. These conditions, generally, have persisted since early 2011, and have had a cumulative effect on the market where increased volumes of supply have led to an increasingly depressed uranium spot price.

TradeTech has estimated that the cumulative impact of these transfers on the Exchange Value (TradeTech's monthly  $U_3O_8$  spot price) totaled \$16.95 per pound  $U_3O_8$  in 2012-2015. The median impact for each individual year is shown in **Figure 3**.

**Figure 3**  
**Cumulative DOE Transfer Price Impact**



For a producer with operating costs of \$35.90 per pound U<sub>3</sub>O<sub>8</sub> and a 21 percent exposure to the spot market, reductions in realized prices (reported by EIA in 2015 to equal \$42.91 per pound U<sub>3</sub>O<sub>8</sub>), partly attributable to this negative price impact, result in increasingly reduced margins. On this basis, for a producer that is 100 percent exposed to the spot market, margins are reduced by approximately 35 percent; should that producer's realized prices equal today's spot prices, the gross loss is especially acute, resulting in a substantial net loss (with revenue totaling 35 percent less than costs).

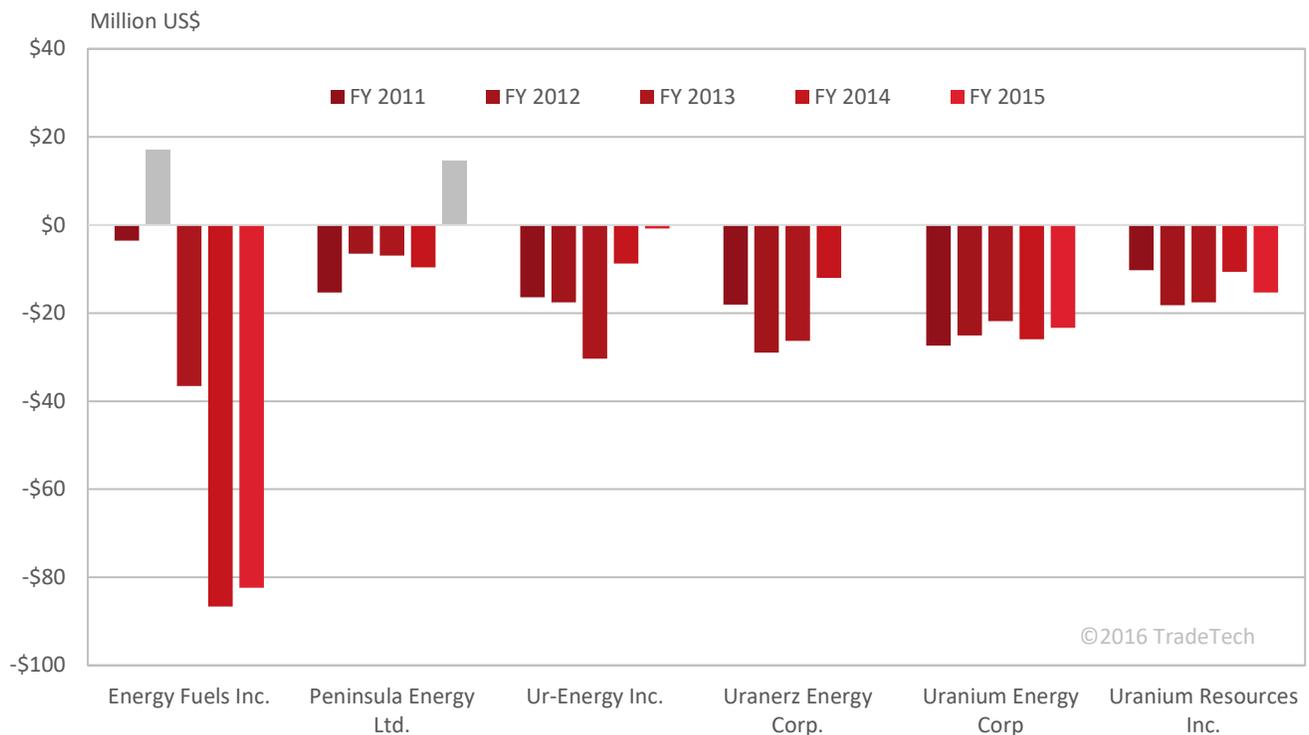
However, with average full costs estimated at \$66.85 per pound U<sub>3</sub>O<sub>8</sub> and more producers necessarily embracing market-related contracts, the situation is increasingly untenable. US producers are facing increasingly severe economic challenges as term contracts cease to provide revenue support, largely due to utility access to price-insulated supply. As new contracts are increasingly tied to today's prices, TradeTech believes uranium prices have been impacted by a number of factors, including increased competition from price-insensitive suppliers such as DOE, persistent oversupply in the uranium market, and reduced demand as a result of premature nuclear power plant closures.

#### *Cumulative Impact*

The cumulative impact of these factors has had an adverse effect on growth in the US uranium market, the net result being fewer projects brought into production and, in fact, many that have been either deferred or mothballed. For both incumbent and potential suppliers, the ability to attract financing has been especially challenging in recent years as capital markets have generally taken a sober view of nuclear power's increasingly distant growth horizon. This is an especially salient point for US producers that are principally concerned with financing debt, which for some continues to grow with each year of only marginally marketable production.

Over the last six months, the long-run uranium spot price decline has gained momentum. This has served to highlight the fact that while a marginal spot price reduction that can be linked to a specific cause may not appear to be especially impactful in the short run, there appears to be a compounding accelerating effect when none of the factors abate for an extended period of time. And, while each dimension listed above could itself be considered unfavorable toward supply-side growth in any price environment, these factors combined have placed sustained downward pressure on uranium prices, the adverse material effect of which has been net losses totaling over \$105 million dollars for US uranium producers in 2015 (**Figure 4**). In fact, certain producers may not recover investments in their respective uranium mining assets and facilities in the foreseeable future due to the persistence of poor market conditions for the US uranium mining industry.

**Figure 4**  
**US Uranium Producers Net Loss, 2011-2015**



Looking to the future, TradeTech’s models indicate that DOE material transfers entering the spot uranium will continue to have a measurable adverse material impact on uranium market prices and, by extension, uranium producers. If DOE were to completely cease material transfers, then producers would see improvement in the market.