[6450-01-P]

DEPARTMENT OF ENERGY

Excess Uranium Management: Effects of DOE Transfers of Excess Uranium on Domestic Uranium Mining, Conversion, and Enrichment Industries; Notice of Issues for Public Comment

AGENCY: Office of Nuclear Energy, Department of Energy.

ACTION: Request for public comment.

SUMMARY: The U.S. Department of Energy (DOE) plans to issue a new Secretarial Determination covering continued transfers of uranium for cleanup services at the Portsmouth Gaseous Diffusion Plant and for down-blending of highly-enriched uranium (HEU) to low-enriched uranium (LEU). In support of this process, DOE issued a Request for Information that solicited information about the effects of continued uranium transfers on the domestic uranium industries and recommendations about factors to be considered in assessing the possible impacts of DOE transfers. DOE also commissioned an economic analysis of the effects of its proposed uranium transfers. DOE now provides for public review the responses received from the public, the economic analysis prepared for DOE, and a list of factors DOE has identified for analysis of the impacts of DOE transfers on the uranium mining, conversion, and enrichment industries.

DOE requests comment on this list of factors, the information and documents made available through this notice, and the included summary of information considered.

DATES: DOE will accept comments, data, and information responding to this proposal submitted on or before April 6, 2015.

ADDRESSES: Interested persons may submit comments by any of the following methods.

1. Email: RFI-UraniumTransfers@hq.doe.gov. Submit electronic comments in WordPerfect, Microsoft Word, PDF, or ASCII file format, and avoid the use of special characters or any form of encryption.
2. Postal Mail: Mr. David Henderson, U.S. Department of Energy, Office of Nuclear Energy, Mailstop NE-52, 19901 Germantown Rd., Germantown, MD 20874-1290. If possible, please submit all items on a compact disk (CD), in which case it is not necessary to include printed copies.
3. Hand Delivery/Courier: Mr. David Henderson, U.S. Department of Energy, Office of Nuclear Energy, Mailstop NE-52, 19901 Germantown Rd., Germantown, MD 20874-1290. Phone: (301) 903-2590. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

No facsimiles (faxes) will be accepted. Supporting documents are available on the Internet at http://www.energy.gov/ne/downloads/excess-uranium-management.

FOR FURTHER INFORMATION CONTACT:

Mr. David Henderson, U.S. Department of Energy, Office of Nuclear Energy, Mailstop NE-52, 19901 Germantown Rd., Germantown, MD 20874-1290. Phone: (301) 903-2590. Email: David.Henderson@Nuclear.Energy.Gov.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Introduction

A. Excess Uranium Inventory

The Department of Energy (DOE) holds inventories of uranium in various forms and quantities—including low-enriched uranium (LEU) and natural uranium—that have been declared as excess and are not dedicated to U.S. national security missions. Within DOE, the Office of Nuclear Energy (NE), the Office of Environmental Management (EM), and the National Nuclear Security Administration (NNSA) coordinate the management of these excess uranium inventories. DOE explained its approach to managing this inventory in a July 2013 Report to Congress, *Excess Uranium Inventory Management Plan* (2013 Plan).

Much of this excess uranium has substantial economic value on the open market. One tool that DOE has used to manage its excess uranium inventory has been to enter into transactions in which DOE exchanges excess uranium for services. This notice involves uranium transfers of this type under two separate programs. Specifically, DOE transfers uranium in exchange for cleanup services at the Portsmouth Gaseous Diffusion Plant and for down-blending of highly-enriched uranium (HEU) to LEU. DOE currently transfers uranium for these two

programs at an aggregate rate of approximately 2,705 metric tons of natural uranium equivalent (MTU) per year.[1]

B. Statutory Authority

DOE manages its excess uranium inventory in accordance with the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq., "AEA") and other applicable law. Specifically, Title I, Chapters 6–7, 14, of the AEA authorize DOE to transfer special nuclear material and source material. LEU and natural uranium are types of special nuclear material and source material, respectively. The USEC Privatization Act (Pub. L. 104-134, 42 U.S.C. 2297h et seq.) places certain limitations on DOE's authority to transfer uranium from its excess uranium inventory. Specifically, under section 3112(d)(2)(B) of the USEC Privatization Act (42 U.S.C. 2297h-10(d)(2)(B)), the Secretary must determine that the transfers "will not have an adverse material impact on the domestic uranium mining, conversion or enrichment industry, taking into account the sales of uranium under the Russian Highly Enriched Uranium Agreement and the Suspension Agreement" before DOE makes certain transfers of natural or low-enriched uranium under the AEA. Section 306(a) of Division D, Title III of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235), limits the validity of any determination by the Secretary under Section 3112(d)(2)(B) of the USEC Privatization Act to no more than two calendar years subsequent to the determination.

[1] With respect to a given amount of LEU, the "natural uranium equivalent" is the amount of natural uranium feed that would be required to produce that amount of LEU. The ratio of feed to product is a function of the assay of the feed and the desired assays of the enriched product and the depleted tails ("assay" refers to the ratio of the fissile isotope U-235 to other isotopes of uranium such as U-234 and U-238). The industry generally refers to the enriched product as "Enriched Uranium Product" or EUP and to the tails as "depleted uranium," DU, "depleted uranium hexafluoride" or DUF_6.

C. Procedural History

In accordance with the above statutes and other laws, the Secretary has periodically determined whether certain transfers of natural and low-enriched uranium will have an adverse material impact on the domestic uranium industries. DOE issued the most recent Secretarial Determination in May 2014. That determination covered transfers of up to a total of 2,705 MTU per year natural uranium equivalent, broken down as follows: up to 650 MTU per year of natural uranium equivalent in the form of LEU transferred for downblending, with the balance, but not less than 2,055 MTU per year of natural uranium equivalent for cleanup services at the Paducah or Portsmouth Gaseous Diffusion Plant.[2] At this time, DOE is conducting uranium transfers consistent with the May 2014 Secretarial Determination.

To inform the May 2014 Secretarial Determination—as it had for a number of previous determinations—DOE tasked Energy Resources International, Inc. (ERI) with assessing the potential effects on the domestic uranium mining, conversion, and enrichment industries from DOE's proposed volume of uranium transfers. In addition to its review and consideration of the report prepared by ERI (2014 ERI Report), DOE held in-person meetings and accepted written communications regarding the transfers from several entities that expressed an interest in DOE's proposed uranium transactions. DOE staff then prepared a separate analysis based on these and other inputs and recommended a course of action to the Secretary.

DOE plans to issue a new Secretarial Determination pursuant to section 3112(d). As a preparatory step, DOE sought information from the public through a Request for Information published in the **Federal Register** on December 8, 2014 (79 FR 72661). DOE is now soliciting additional public input.

[2] See May 15, 2014, Secretarial Determination.

D. Request for Information

In the December 8, 2014, Request for Information (79 FR 72661), DOE solicited information from interested stakeholders and specifically requested comment on the following seven questions.

(1) What factors should DOE consider in assessing whether transfers will have adverse material impacts?

(2) With respect to transfers from DOE's excess uranium inventory in calendar years 2012, 2013, and 2014, what have been the effects of transfers in uranium markets and the consequences for the domestic uranium mining, conversion, and enrichment industries relative to other market factors?

(3) What market effects and industry consequences could DOE expect from continued transfers at annual rates comparable to the transfers described in the 2014 Secretarial Determination?

(4) Would transfers at a lower annual rate significantly change these effects, and if so, how?

(5) Are there actions DOE could take other than altering the annual rate of transfers that would mitigate any negative effects on these industries?

(6) Are there actions DOE could take with respect to transfers that would have positive effects on these industries?

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

In response to this request, DOE received comments from a diverse group of parties representing interests across the nuclear industry. DOE received comments from members of the

uranium mining, conversion, and enrichment industries. DOE also received comments from trade associations, nuclear utilities, local governmental bodies, and members of the public. All comments are available at http://www.energy.gov/ne/downloads/excess-uranium-management.[3]

E. Market Analyses

In preparation for the May 2014 Secretarial Determination, DOE tasked ERI to assess the potential effects on the domestic uranium mining, conversion, and enrichment industries of the introduction of DOE excess uranium inventory in various forms and quantities through sale or transfer during calendar years 2014 through 2033. DOE may consider this report in its deliberations regarding a new Determination ("2014 ERI Report").

In preparation for the planned Secretarial Determination that is the subject of today's notice, DOE tasked ERI with preparing an additional analysis of DOE transfers ("2015 ERI Report"). For this additional analysis, DOE tasked ERI to consider the effect of hypothetical DOE transfers on the domestic uranium industries under three different scenarios. Under Scenario 1, DOE would continue transfers at the current annual rate of 2,705 MTU per year, consisting of 2,055 MTU for cleanup work and 650 MTU as low-enriched uranium for downblending. Under Scenario 2, DOE would decrease transfers to a rate corresponding with 1,855 MTU per year, consisting of 1,410 MTU for cleanup work and 445 MTU as low-enriched uranium for downblending. Under Scenario 3, DOE would cease transfers for cleanup work and downblending.

DOE also asked ERI to provide specific categories of information in its analysis, including a discussion of price volatility and regional differences in the markets. DOE tasked ERI to discuss the implications of changing certain assumptions underlying its analysis,

[3] Some comments were marked as containing confidential information. Those comments are provided with confidential information removed.

specifically regarding what proportion of DOE material would enter the global as compared to the domestic market and regarding the share of DOE material delivered under long-term contracts. ERI's report also includes updated information regarding changes in the market between April 2014 and February 2015. Both the 2014 ERI Report and the 2015 ERI Report can be found at http://www.energy.gov/ne/downloads/excess-uranium-management.

II. Analytical Approach

DOE issues Secretarial Determinations pursuant to Section 3112(d) of the USEC Privatization Act. Section 3112(d) states that DOE may transfer "natural and low-enriched uranium" if, among other things, "the Secretary determines that the sale of the material will not have an adverse material impact on the domestic uranium mining, conversion, or enrichment industry, taking into account the sales of uranium under the Russian HEU Agreement and the Suspension Agreement." After considering this statutory language, DOE has developed a set of factors that it proposes to consider in determining whether its uranium transfers will have an "adverse material impact" on the domestic uranium industries.

A. Overview

The USEC Privatization Act does not clearly indicate what kind or degree of effect or influence on an industry would constitute an "adverse material impact." As discussed below, these words are susceptible of many meanings. Contextual clues provide some guidance in understanding the phrase, but DOE has not identified context (such as a statutory definition) that would unambiguously settle what an "adverse material impact" is.

Moreover, the meaning of the phrase is likely to depend in part on the factual context in which it is to be applied. Uranium transactions can take myriad forms, and the effect of any

given transaction on any one or all of these industries will depend heavily on the facts and circumstances at the time of the transaction. DOE's inventory of uranium is changing over time, and Congress could not have anticipated the specific characteristics of every potential transaction. Thus, it would be unsurprising for the statute to describe DOE's mandate in open-ended terms, leaving DOE to elaborate details as and when DOE applied the statute over time.

Thus, the Secretary will need to exercise judgment to develop an understanding of "adverse material impact," in its statutory context, as applicable to a given potential transfer or sale of uranium. Part of that task involves establishing an analytical framework to form the basis of and reach a determination about the impacts of DOE's transfers. The Secretary is responsible for reviewing relevant information and exercising judgment to decide whether a particular sale or transfer will have an adverse material impact.

DOE's first step in developing an analytical framework is to elaborate what it means for transfers to "have" an "impact." DOE believes that it can appropriately fulfill the purpose of the statute by reading this phrase to refer to "impacts" that have a causal relationship to DOE transfers. The overall thrust of Section 3112 is to permit transfers and sales of uranium to the degree consistent with various policy considerations set forth in various paragraphs.[4] Section 3112(d) calls for the Secretary's predictive judgment, before DOE engages in a transaction, whether the transaction will have an adverse material impact on the domestic uranium industries. The notion of causation is implicit in this structure. If domestic industries would experience a given negative condition regardless whether DOE made a particular transfer, it would ill serve the purposes of the USEC Privatization Act for 3112(d) to block the transfer.

[4] In passing the USEC Privatization Act, Congress recognized that DOE would have a substantial uranium inventory after privatization. Congress included Section 3112(d) to ensure that DOE could continue to use sales or transfers from its uranium inventory as a management tool. *See* S. Rep. 104-173, at 16–17; see also 141 Cong. Rec. S6106–07 (daily ed. May 3, 1995) (statement of Sen. Domenici).[4]

Thus, in assessing a given transfer, DOE will essentially evaluate two forecasts: one reflecting the state of the domestic uranium industries if DOE goes forward with the transfer, and one reflecting the state of the domestic uranium industries if DOE does not go forward with the transfer. DOE will then compare these two forecasts to determine the relevant impacts on the domestic uranium industries. It bears mention that not every difference in predicted outcomes will necessarily count as an impact of the transfer. For example, if DOE transfers would be the final contribution after independent causes have pushed an industry to a given adverse state, DOE might not regard the full scope of the adversity as attributable to the transfers.

With respect to assessing whether the adverse impacts of a transfer would be "material," DOE observes that the word "material" is used to denote situations "of real importance or great consequence." *See Webster's Third New International Dictionary* 31, 1392 (1961). How large consequences must be to qualify as "material" varies in different legal contexts. In light of the overall goals and structure of the USEC Privatization Act, DOE believes it is reasonable to view material adverse impacts as referring to impacts that go beyond normal market fluctuations, such as those that threaten the viability of an industry.

As noted above, one purpose of the USEC Privatization Act was that DOE should manage and eventually dispose of the large legacy inventory that the privatization of USEC would leave it. In privatizing the United States Enrichment Corporation, Congress recognized that DOE would have uranium inventory left over and that this inventory would have substantial economic value. By including 3112(d), Congress preserved the Secretary's discretion to utilize uranium transfers as a tool in managing the uranium inventory, and the substantial value embodied therein. If Congress had not wanted DOE to make productive use ofits inventory, it could have prohibited all sales by the Department with or without a determination. Indeed, the

USEC Privatization Act explicitly directed DOE to transfer various quantities of uranium to market participants. 42 U.S.C. 2297h-10(b)(2) & (c).

Section 3112 also provides helpful context that indicates the magnitude of industry impact that Congress considered acceptable. The statute specifically authorized material delivered under the Russian HEU Agreement to enter the U.S. market notwithstanding a preexisting suspension agreement limiting the entry of this material. 42 U.S.C. 2297h-10(b)(3), (5)–(7). The act contained annual limits on deliveries of the natural uranium component of the Russian material. The limits started at 2 million pounds U3O8 equivalent in 1998, and increased by 2 million pounds each year reaching a maximum of 20 million pounds U3O8 equivalent in 2009 and each year thereafter. 42 U.S.C. 2297h-10(b)(5).[5] For comparison purposes, this last figure represented over four times the volume of U3O8 produced at U.S. mines in 1996, the year the statute was passed. EIA, Domestic Uranium Production Report (2005). The size of this explicit authorization informs DOE's understanding of what impacts Congress would have regarded as "material." It seems unlikely that Congress would have authorized in 3112(b) transfers that would have been inconsistent with the policy goals of 3112(d).

Indeed, the structure and legislative history of 3112(b) confirm that the schedule for Russian material's entering domestic markets reflects Congress's balancing of concerns similar to those that motivated 3112(d)(2). Congress could have simply allowed all Russian material into the U.S. without limitation. Instead, Congress provided a schedule that ramped up over a period of 20 years. Thus, Congress was attempting to balance the competing concerns of providing a market for the consumption of downblended Russian HEU and protecting the domestic uranium industries from large-scale disruption. The schedule outlined in Section

[5] Sales under the Russian HEU Agreement ceased at the end of 2013.

3112(b) reveals the level of market interference that Congress believed struck that balance. This notion is further confirmed by the legislative history of this provision, which specifically states that Congress was trying to balance the interests in maintaining the Russian HEU Agreement with the interests of the domestic uranium industries. See S. Rep. 104-173, at 14. Further, the legislative history explains that the schedule of maximum deliveries was designed to protect against disruptions to the uranium markets by providing a "reasonable, predictable, and measured introduction of this Russian material into the domestic uranium market." *Id.* at 28.

Section 3112(d)(2) confirms that DOE's consideration of 3112(b) in interpreting 3112(d)(2) is reasonable. Section 3112(d)(2) explicitly directs the Secretary to "take into account" the sales of uranium under the Russian HEU Agreement and the Suspension Agreement. DOE believes that in addition to requiring the Secretary to consider any transfers under these programs that are ongoing at the time of DOE's transfers, this language asks the Secretary to consider and take into account the history and context of these transfers and the statutory text authorizing them. In addition, it bears mention that in a 3112(d)(2) deliberation DOE may take account of the fact that the cessation of the Russian HEU Agreement removed a substantial amount of secondary supply from uranium markets.

The preceding discussion is not intended automatically to support transfers of up to 20 million pounds under Section 3112(d). The Secretary must exercise his own judgment as to whether transfers would cause an adverse material impact, in light of market and industry conditions today. However, DOE believes that this provision provides some insight into what scale of market interference Congress considered acceptable, and hence would not constitute an "adverse material impact."

For these reasons, DOE believes that whether the effects of a given transfer constitute an "adverse material impact" should not depend on a quantitative bright-line test, but rather should be based on an evaluation of potential impacts by examining a number of factors. Accordingly, DOE proposes to consider the effects of DOE transfers using a set of factors. DOE proposes to analyze its transfers in light of the best available information, data and expert judgment to form the basis for the Secretary's determination.

B. Factors for Consideration

In the December 2014 RFI, DOE sought comment from the public on what factors it should consider in assessing whether a given set of transfers would have an adverse material impact on the domestic uranium industries. After considering the comments received, DOE believes the following factors may be relevant to this question:

1. Market prices
2. Realized prices of current operators
3. Production at existing facilities
4. Employment levels in the industry
5. Changes in capital improvement plans and development of future facilities
6. Long-term viability and health of the industry

These factors reflect many of those suggested by commenters, and DOE believes they reflect the types of impacts that a DOE transfer could in principle have on a domestic uranium industry. Not every factor will necessarily be relevant on a given occasion or to a particular industry; DOE intends this list of factors only as a guide to its analysis. DOE is open to additional comment on these factors. There are a few factors proposed by commenters that are not included in DOE's list, for the reasons outlined below.

One commenter suggested that DOE should consider the effects of its transfers on the profitability of the industries. Comment of ConverDyn, Encl. at 2. Another commenter suggested that DOE should consider the effect of its transfers on gross profit margin. TradeTech Report, 12–13. DOE notes that profit and profitability can vary depending on company-specific circumstances and accounting treatments, and therefore may not be reliable indicators of how a given market phenomenon like DOE transfers is affecting an industry. Moreover, for assessing the impact on an industry, the profit of participants is, in a sense, an indirect measure, as it is principally a link between market dynamics—prices and sales—and the ultimate reaction of industry in terms of increasing or decreasing activity. For these reasons, DOE proposes to look instead at factors which are either more directly related to industry impact or are more reliable predictors of industry impact.

Several commenters suggested that DOE should consider current market conditions as a factor. Comment of UPA, at 3; comment of Uranerz, at 3. DOE agrees that current market conditions are relevant, and DOE plans to consider the potential effects of DOE transfers in light of the relevant context, which includes current market conditions as well as past and projected future conditions. DOE believes that considering broader market conditions in this manner will yield insight into how the domestic uranium industries can be expected to respond to DOE transfers.

Some commenters suggested that DOE consider uncommitted utility demand or uncovered utility requirements compared to the level of DOE transfers. UPA and others, for example, stated that transfers at the rate described in the May 2014 Secretarial Determination would constitute more than 100 percent of global uncommitted utility demand in calendar year 2015 and almost 60 percent in 2016. These commenters cite to a report by the Ux Consulting

Company, LLC (UxC): UxC Uranium Market Outlook – Q4 2014 (2014).[6] Comment of UPA, at 2–3; see also comment of Uranerz Energy Corp., at 2–3; comment of Signal Equities, at 2.[7] Similarly, URENCO USA Inc. (URENCO)—citing UxC's Q4 Enrichment Market Outlook—stated that DOE transfers of LEU will constitute 72% of uncovered enrichment requirements in 2015. Comment of URENCO, at 4.[8] While the volume of uncovered requirements may be information relevant to the overall assessment, DOE is not convinced a particular comparison between that volume and the magnitude of a proposed transfer is reliable as an indication of the impacts of its transfers on the uranium industries. It is far from clear that uranium from proposed DOE transfers in 2015 and 2016 would be sold only to utilities with uncovered requirements in the year of transfer. The market involves many participants other than utilities seeking to fill uncovered requirements. For example, intermediaries that hold mid- or long-term contracts may need to purchase material on the spot market to fulfill contracted deliveries. As discussed below, some market participants—such as China—purchase material in excess of their requirements. Traders and investment funds may also make purchases independent of reactor requirements.[9]

[6] UPA refers to "uncommitted utility demand." It appears that they are referring to UxC's estimate of uncovered reactor requirements, found at UxC Uranium Market Outlook – Q4 2014, 61–62 (2014).

[7] Commenters cite to UxC's Q3 Uranium Market Outlook. In addition to UxC's most recent estimate of uncovered utility uranium requirements, UxC Uranium Market Outlook – Q4 2014, 61–62 (2014), DOE has reviewed information from EIA and the Euratom Supply Agency. EIA, 2013 Uranium Marketing Report, 34 (2014); ESA, Natural Uranium Coverage 2014-2022, available at http://ec.europa.eu/euratom/docs/F9-CoverageRate.xls.

[8] DOE has reviewed UxC's most recent estimate of uncovered enrichment requirements found at: UxC Enrichment Market Outlook – Q4 2014, 39–40 (2014). DOE also notes that UxC's most recent report on the conversion market does not include updated numbers on uncovered utility requirements for conversion services. UxC Conversion Market Outlook – December 2014, 37 (2014).

[9] Comparing the financial statements of Uranium Production Corporation—a uranium investment fund—reveals that between November 30, 2013, and November 30, 2014, UPC increased its stock by approximately 1.5 million pounds U3O8 equivalent—1,311,286 pounds U_3O_8 and 261,285 pounds U_3O_8 equivalent contained within 100,000 kgU of UF_6. UPC, 2015 Third Quarter Report, 2 (2015), available at http://www.uraniumparticipation.com/i/pdf/financials/2015-Q3-Report-for-the-Three-Months-Ended-November-30.pdf; UPC, 2014 Third Quarter Report, 2 (2014), available at http://www.uraniumparticipation.com/i/pdf/financials/2014-Q3.pdf. UPC's stated investment strategy is to buy and hold uranium rather than actively trading in response to short-term shifts in prices. UPC, Investor Update Presentation, 17 (Aug. 2014), available at http://www.uraniumparticipation.com/i/pdf/ppt/UPC-Investor-Update-August-2014.pdf.

Thus, spot demand in any given year may substantially exceed uncovered requirements. At least for the uranium industry, this is confirmed by the very report that commenters cite to in their comments. UxC projects that spot demand in 2015 and 2016 will be significantly higher than uncovered requirements in both years. Compare Table 14 with Table 15 of UxC Uranium Market Outlook – Q4 2014, 62–63 (2014). In addition, the company that currently distributes on the broader market most of the uranium that DOE is transferring under the 2014 Secretarial Determination represents that it has already sold almost all of this material to utilities under forward delivery contracts. Comment of Traxys, at 1.[10] Therefore, the global uncommitted utility figures cited by UPA and others presumably already take account of DOE transfers as an element of *covered* requirements.[11]

Commenters also proposed share price and market capitalization as factors for consideration. E.g., Comment of ConverDyn, Enclosure, at 2. DOE is not convinced that either of these provides an appropriate indicator for whether DOE transfers will cause an adverse material impact, because both market capitalization and share price are too attenuated from the effects of DOE transfers. While share price certainly does influence a company's decisions about investment and allocation of capital, it is only one factor. At the same time, a company's share price tends to reflect myriad inputs besides the effects of a market phenomenon like DOE transfers. Other contributions to share price can include the nature of company management, gearing ratio (debt vs. equity), inflation, and the particular risks associated with the uranium market (such as the influence of political changes, like the shift in energy policy in Germany or

[10] Traxys North America LLP has a contractual arrangement with DOE's contractor at Portsmouth, Fluor-B&W Portsmouth, to purchase all uranium hexafluoride FBP receives from DOE. The existence of FBP's contract with Traxys does not obligate DOE to transfer to FBP the amounts of uranium under consideration.

[11] Traxys represented that it had already sold to utilities "almost 100%" of the material from DOE as early as July 7, 2014. Declaration of Kevin P. Smith, *ConverDyn v. Moniz*, Case no. 1:14-cv-01012-RBW, Document 17-7 at ¶6 (July 7, 2014). The figures for global uncommitted utility demand cited by UPA were released after this date. See Comment of UPA, at 3 n.2.

public responses to nuclear accidents). Furthermore, many of the largest U.S. producers are part of multi-line companies whose share prices depend in part on product markets other than uranium. For these reasons, DOE believes that share price and market capitalization are too highly attenuated to serve as useful proxies for industry impact.

Some commenters suggested that DOE should consider the "spill-over effects" across the different nuclear fuel industries that might cause indirect harm. E.g., Comment of URENCO, at 5. Although the commenter did not explain what "spill-over effects" it was referring to, DOE recognizes that as a general matter the interaction between the different uranium markets can be relevant, particularly the relationship between enrichment prices and uranium concentrate/conversion prices. As enrichment can be used to provide additional uranium concentrate as uranium hexafluoride—either through underfeeding or re-enrichment of tails—there is a potential for changes in one market to affect the others. However, DOE does not believe this should be considered as a separate factor. Instead, DOE believes these effects are better understood and assessed when considered as part of the analysis for each of the six market factors listed above.

III. Summary of Information Under Consideration

In this section, DOE summarizes for each industry the information that DOE believes to be relevant with respect to the above-listed factors. In addition to the 2014 ERI Report, the 2015 ERI Report, and the comments received in response to the RFI, in some instances DOE refers to additional information from other sources. Where available, DOE provides a link to where these documents are available on the internet.

A. Uranium Mining Industry

1. *Market prices*

In preparation for the proposed Secretarial Determination, DOE tasked ERI with estimating the effect of DOE transfers on the market prices for uranium concentrates. In the 2015 ERI Report, as in previous reports, ERI estimated this effect by employing two different types of model that rely on somewhat different assumptions: a market clearing price model and an econometric model. For its market clearing price model, ERI constructs individual supply and demand curves and compares the clearing price with and without DOE transfers.[12] To develop its supply curves, ERI gathers available information on the costs facing each individual supply source. ERI then uses that information to estimate the marginal cost of supply for each source using a discounted cash flow model. 2015 ERI Report, 41 n.22. To develop its demand curve, ERI assumes a perfectly inelastic demand curve based on its Reference Nuclear Power Growth forecast.[13] ERI develops this forecast by combining estimates of the needs and reload schedules for operating plants with projections about future reactor retirements and new development. 2015 ERI Report, 17–18.

Applying this approach to the three scenarios listed in Section I.E above—2,705 MTU per year (scenario 1), 1,855 MTU per year (scenario 2), or zero transfers (scenario 3)—ERI estimates that DOE transfers will have the effects listed in Table 1. Transfers at the rate of 2,705 MTU per year would cause the price of uranium concentrates to be lower than it would be without DOE transfers by, on average, $2.80 between 2015 and 2024—with prices being $3.00 and $2.80 lower in 2015 and 2016 specifically. 2015 ERI Report, 45. For DOE transfers at a rate of 1,855 MTU per year, ERI estimates that prices would be, on average, $2.60 lower

[12] The market clearing price is the price at which quantity supplied is equal to quantity demanded.
[13] In other words, ERI assumes that demand for uranium will stay the same regardless of variations in market price.

between 2015 and 2024—with prices being $2.10 and $1.90 lower in 2015 and 2016 specifically. If DOE ceased transfers under these two programs, ERI estimates that prices would be, on average, $1.30 lower between 2015 and 2024—with prices being $0.30 and $0.10 lower in 2015 and 2016 specifically.[14] It is important to emphasize that this is not a prediction that prices will drop by the specified amount once DOE begins transfers following a new determination. A level of price suppression consistent with the estimate for Scenario 1 would, on ERI's analysis, already be reflected in the current market price because DOE is currently transferring uranium at that rate. 2015 ERI Report, 44. This means that if DOE continued transferring at Scenario 1 levels, the market prices would not change; if DOE began transferring at Scenario 2 levels, the market price would be expected to rise by approximately $0.90; if DOE ceased transfers under these programs, market prices would be expected to rise by $2.70. See Table 4.1 of 2015 ERI Report, 45. These prices represent ERI's prediction of the average effect over the next decade, rather than for any given year.

	2015 ERI Report	**2014 ERI Report**
	Estimated Price Effect (2015–2024)	**Estimated Price Effect (2014–2023)**
Scenario 1	$2.80	$2.90
Scenario 2	$2.60	-
Scenario 3	$1.30	-

Table 1. ERI's Estimate of Effect of DOE Transfers on Uranium Concentrate Spot and Term Prices in $ per pound U_3O_8 (Market Clearing Approach)

ERI then compares these numbers to the current spot and term price indicators published by TradeTech on January 31, 2015—i.e. $37.25 per pound U_3O_8 on the spot market, and $50.00

[14] Note that the transfer rates in these scenarios refer only to the level of uranium transfers for cleanup at Portsmouth and downblending of LEU. They do not include transfers for three other programs, TVA BLEU, Energy Northwest depleted uranium, and a possible future sale of depleted uranium currently under negotiation. 2015 ERI Report, 21–32. The level of transfers across these three programs is the same in all three scenarios. ERI's predictions about market price reflect these transfers as well as the Portsmouth and downblending transfers.

per pound U_3O_8 on the term market. As a percentage of the current prices, the average price effect attributable to DOE's transfers over the period 2015-2024 under Scenario 1 represents approximately 7.6% of the current spot price and 5.7% of the current term price. Under Scenario 2, the average price effect over the same period represents 7.1% of the spot price and 5.3% of the term price. Under Scenario 3, the average price effect represents 3.6% of the spot price and 2.7% of the term price. 2015 ERI Report, 47, 49.

The second model that ERI used to predict the effects of DOE transfers specifically on the spot price for uranium using an econometric model. A summary of ERI's estimates using this model appears in Table 2. ERI compared the monthly spot and term market prices published by TradeTech with published offers to sell uranium for delivery within one year of publication and published inquiries to purchase uranium for delivery within one year. Based on this information, ERI developed a multivariable correlation to estimate how the market prices would respond to the availability of new supply from DOE. 2015 ERI Report, 50. Applying this econometric model, ERI predicts that transfers under Scenario 1 would cause the spot price to be lower by about $2.40 per pound between 2015 and 2017 than it would be in the absence of transfers, and by about $5.10 between 2018 and 2024. For Scenario 2, ERI estimated that the spot price would be lower by about $1.70 per pound between 2015 and 2017 than it would be without transfers, and by about $4.80 between 2018 and 2024. For Scenario 3, ERI estimated that the spot price would be lower by about $0.30 per pound between 2015 and 2017, and by $2.00 between 2018 and 2024. 2015 ERI Report, 53. Again, as noted for the market clearing analysis, the market price currently takes account of the already ongoing transfers at the levels of Scenario 1. Thus, on ERI's analysis prices already exhibit a level of price suppression similar to the level predicted in the near term under Scenario 1. 2015 ERI Report, 52–53.

	2015 ERI Report		2014 ERI Report	
	Estimated Price Effect (2015–2017)	**Estimated Price Effect (2018–2024)**	**Estimated Price Effect (2014–2016)**	**Estimated Price Effect (2017–2021)**
Scenario 1	$2.40	$5.10	$2.80	$5.50
Scenario 2	$1.70	$4.80	-	-
Scenario 3	$0.30	$2.00	-	-

Table 2. ERI's Estimate of Effect of DOE Transfers on Uranium Concentrate Spot Price in $ per pound U_3O_8 (Econometric Model)[15]

For the 2014 ERI Report, ERI had conducted a similar market clearing approach for a level of transfers that is equal to Scenario 1 of the 2015 ERI Report. Although that report used slightly older data, the results are very similar. Notably, ERI estimated that the price effect attributable to DOE transfers at the current rates is $2.90 between 2014 and 2023—with prices being $3.00 lower in 2014 and 2015, and $2.80 lower in 2016.[16] 2014 ERI Report, 40. ERI also conducted a similar econometric analysis for a level of transfers that is equal to Scenario 1. 2014 ERI Report, 42–45. The econometric analysis in the 2014 ERI Report estimated a slightly higher price effect compared to the 2015 Report. Specifically, ERI estimated that DOE transfers would cause the spot price to be lower by about $2.80 per pound between 2014 and 2016, and by about $5.50 between 2017 and 2021. 2014 ERI Report, 44. The updated analysis in the 2015 ERI Report produces slightly different figures because it relies on updated estimates of the amount of DOE material expected to affect the markets. Compare Table 3.4 of 2014 ERI Report, 33, with Tables 3.6, 3.7, and 3.8 of 2015 ERI Report, 32–34.

Three commenters provided their own estimates of the price effects of DOE transfers.

[15] It is more appropriate to compare the estimated price effect to the forecasted market price at the time of the effect. ERI's report does not provide specific quantifications of the forecasted market price in out-years. Thus, it is not possible to list the percentage of expected market price with specificity. However, DOE notes that, at least with respect to the later term projections, ERI predicts that market prices will be in the $52 to $57 range after 2017. 2015 ERI Report, 52; 2014 ERI Report, 44.

[16] ERI also compared those numbers to then current term and spot price indicators as of March 31, 2014. At that time, the TradeTech price indicator was $34.00 per pound U_3O_8 on the spot market and $45.00 per pound U_3O_8 on the term market. 2014 ERI Report, 23.

UPA attached to its comment a market analysis it commissioned from TradeTech, LLC, a uranium market consultant. Comment of UPA, Attachment, TradeTech, "UPA DOE Material Transfer Study" (2015) (hereinafter "TradeTech Report"). A summary of TradeTech's estimates appears in Table 3. TradeTech explains that it estimated the price effect of DOE transfers using its proprietary Dynamic Pricing Model. This model is an econometric forecasting approach to estimate the equilibrium between two dimensions TradeTech calls "active supply" and "active demand." In its estimates, TradeTech assumes that 50 percent of DOE transfers enters the spot market and 50 percent enters the term market. TradeTech Report, 14. Using its model, TradeTech estimates that DOE's transfer reduced the spot price by an average of $3.55 per pound between January 2012 and December 2014. TradeTech Report, 15. TradeTech also estimates that continued DOE transfers at current rates would reduce the spot price by an average of $2.43 per pound between January 2015 and December 2016. TradeTech Report, 20.

TradeTech also provides estimates for the effect of DOE transfers at several decreased transfer rates. If DOE transfers decreased to 75% of current levels, TradeTech estimates that the spot price would increase by an average of $0.53 per pound between January 2015 and December 2016. TradeTech Report, 26.[17] Based on TradeTech's estimate of the price suppression of DOE transfers at current levels, it appears that TradeTech is estimating that price suppression at 75% of current levels would be $1.90. If DOE transfers decreased to 50% of current levels, TradeTech estimates that the spot price would increase by an average of $1.10 per pound between January 2015 and December 2016. TradeTech Report, 25. This corresponds to a price suppression of $1.33. If DOE transfers decreased to 25% of current levels, TradeTech

[17] Figures 16–19 of the TradeTech Report show TradeTech's estimates for the price impact at a range of different transfer rates. Although these charts and the related text refer to "Transfers at [25, 50, or 75] Percent of Established 2014 Volumes," it appears that these charts actually reflect an estimate for a 25%, 50%, or 75% *decrease* relative to current levels, rather than transfers at the specified percentage of current levels.

estimates that the spot price would increase by an average of $1.73 per pound between January and 2015 and December 2016. TradeTech Report, 24. This corresponds to a price suppression of $0.70.

TradeTech Report	
Transfer Rate (compared to current)	**Estimated Price Effect (2015–2016)**
100%	$2.43
75%	$1.90
50%	$1.33
25%	$0.70

Table 3. TradeTech's Estimate of Effect of DOE Transfers on Uranium Concentrate Spot Price in $ per pound U_3O_8

Fluor-B&W Portsmouth attached to its comment an April 2014 market analysis from NAC International (NAC). Comment of Fluor-B&W Portsmouth, Attachment A, NAC International, "Impact of DOE Excess Uranium Sales on the U_3O_8 Market" (April 2014) (hereinafter "NAC Report").[18] In its analysis, NAC based its production cost estimates on its Uranium Supply Analysis System (USAS). NAC updates this model each year based on a review of various published reports and presentations. NAC then applies cost models to derive specific cost estimates for individual properties. NAC Report, C-1. Specifically, NAC applies a discounted cash flow rate of return model based on both full cost (including sunk costs) and forward costs for each property. NAC Report, C-2 to C-3. NAC also utilized an estimate of reactor requirements and uncommitted demand developed from its Fuel-Trac database. NAC Report, D-1.

[18] As this report was prepared in April 2014, it does not contain updated information on developments in the markets since that time. The level of uranium transfers that it analyzes is based on the levels specified in the May 2012 Secretarial Determination, which is roughly similar to the current rate of transfers. NAC Report, A-1 to A-3.

NAC developed a range of estimates of the impact of DOE transfers utilizing its production cost estimates at three different rates: 2,800 MTU per year, 2,400 MTU per year, and 10% of U.S. reactor requirements. NAC Report, 3-21 to 3-22. First, NAC applied a methodology it believes approximates ERI's approach to its own cost estimates. Specifically, NAC identified the incremental cost of the last property needed to meet demand in a given year based on total supply and demand. NAC Report, 3-22. NAC then explains that because long-term contracts with fixed pricing mechanisms have allowed some high-cost producers to produce ahead of lower cost supply, it believes a better approach is to base the model on uncommitted supply and demand. NAC then applies a multiplier to these estimates to account for additional incremental costs not included in its site forward production costs estimate. These additional costs include increased site forward costs due to operation at less than nominal capacity, taxes, corporate overhead, and variations in the required rate of return. NAC Report, 3-23. NAC also applies a time shift to the cost trend to account for the fact that producers need a price signal before investing in a new production center—i.e. producers need to have prices that justify an investment before actually making the investment. NAC Report, 3-24. The specific quantitative impact projected by NAC is withheld from the public version of the NAC Report to protect confidential information.

Cameco attached to its comment a market analysis it commissioned from Ux Consulting Company, LLC (UxC), another uranium market consultant. Comment of Cameco Corp., Attachment, UxC Special Report, "Impact of DOE Inventory Sales on the Nuclear Fuel Markets" (January 2015) (hereinafter "UxC Report"). A summary of UxC's estimates of the effect of DOE transfers on future prices appears in Table 4. UxC explains that it estimated the price effect of DOE transfers using two proprietary econometric models: the U-PRICE model and the SWU-

PRICE model. UxC explains that these models were developed using historical data on the nuclear fuel markets collected and compiled by UxC. These two models take into account and quantify the impact of "key factors influencing the markets." UxC also explains that the two models can be linked to simulate the interrelationship between uranium concentrates and enrichment. UxC Report, 3.[19]

Using these two models, UxC estimates the effects of DOE transfers using two slightly different methodologies. For the first approach, what UxC calls the "incremental approach," UxC does not include the cumulative impact of previous years' transfers. The second approach, which UxC calls the "total impact approach," includes sales from previous years. UxC argues that previous years' sales should be included because "such sales have a longer-term effect on market perceptions among both buyers and sellers. In particular, the increased supplies from DOE's sales and transfers removed market opportunities available to other uranium suppliers." UxC Report, 5.

Using its incremental approach, UxC estimates that between 2012 and 2014 DOE's transfer reduced the spot price by an average of $4.50 per pound and the term price by an average of $2.88 per pound. Using its total impact approach, UxC estimates that between 2008 and 2014 DOE's transfers reduced the spot price by an average of $7.11 per pound and the term price by an average of $5.10 per pound. UxC Report, 6–7.

UxC also estimates the effect of DOE continued transfers at current rates for the period 2015 to 2030. UxC estimates that DOE transfers in the near and medium terms would reduce the spot price by an average of $5.78 per pound. UxC projects that this effect will change slightly in the medium term as market prices start to recover. Specifically, DOE transfers will reduce the

[19] Additional information about the U-PRICE model can be found in Chapter 1 of UxC Uranium Market Outlook – Q4 2014, 7–21 (2014).

spot price between 2018 and 2030 by an average of $4.47 per pound. UxC also notes that the former number is larger relative to the expected price of uranium than the latter number (14.1% versus 7.1%). UxC Report, 10. UxC estimates that DOE transfers in the near and medium terms would reduce the term price by an average of $4.86 per pound. Between 2018 and 2030, DOE transfers are estimated to reduce the term price by an average of $5.30 per pound. Again, the near and medium term impact is larger in relation to the expected price (9.0% versus 7.1%). UxC Report, 11.

	UxC Report			
	Near- & Mid-term Price Effect	**Percent of Expected Price**	**Long-term Price Effect**	**Percent of Expected Price**
Spot Price	$5.78	14.1%	$4.47	7.1%
Term Price	$4.86	9.0%	$5.30	7.1%

Table 4. UxC's Estimate of Effect of DOE Transfers on Uranium Concentrate Spot and Term Prices in $ per pound U_3O_8

UxC puts particular focus on the interrelationship between the uranium and enrichment markets. UxC states that uranium and SWU are "substitutes." Thus, UxC uses enrichment prices as an input into its uranium concentrate price forecast, and vice versa. UxC Report, 5, 8, 17. DOE understands that this interplay can take several forms. First, to the extent that enrichers have unsold enrichment capacity, they may apply that excess capacity to underfeeding[20] and/or re-enriching DUF_6 tails.[21] This essentially allows enrichers to produce additional natural uranium hexafluoride, which could then be sold on the open market. Second, if the price of enrichment decreases relative to the price of uranium concentrates, the optimum tails assay

[20] Enrichers can change the amount of natural uranium needed as input ("feed") by applying a greater or lesser amount of enrichment work to a given amount of feed. "Underfeeding" refers to when enrichers ply a greater amount of enrichment work to an amount of feed, thus requiring less feed to achieve the same amount of enriched product.

[21] In addition to "underfeeding," enrichers can apply additional enrichment work to existing depleted uranium from past enrichment processes by feeding them back into the enrichment process. This process is often called "re-enrichment" of tails.

decreases, requiring customers to deliver less natural uranium feed to get the same amount of enriched uranium output.

The other market analyses do not appear to take these interplays into account.[22] But DOE believes the price interplay would be small, and the two effects may potentially offset. Since only some of DOE inventories contain an enrichment component, DOE materials can be expected to have a larger proportional effect on the uranium concentrates and conversion markets as compared to the enrichment market. At current rates, ERI estimates that DOE transfers in 2015 under Scenario 1 would represent 4%, 5%, and 2% of that year's global requirements for uranium, conversion, and enrichment, respectively. Since DOE inventories are a greater proportion of uranium and conversion requirements, it seems likely that the effect of DOE transfers would be to slightly increase the ratio of SWU price to UF_6 price. This would increase the optimum tails assay, which may actually increase demand for uranium concentrates slightly. In addition, practices in the industry suggest that the enrichment component of DOE material does not displace primary production at existing facilities. Enrichers typically do not increase centrifuge capacity without long-term contracts in place to purchase the output. Comment of URENCO, Inc., at 2. Also, some in the market have chosen to allow older centrifuges to retire without being replaced instead of retaining excess capacity. 2015 ERI Report, 16; UxC Enrichment Market Outlook – Q4 2014, 11 (2014). Thus, it is far from clear that for every SWU contained within DOE material, a corresponding amount of primary production becomes excess capacity available for tails re-enrichment or underfeeding. Considering this information as a whole, it does not appear that the interrelationship between the

[22] ERI's market clearing price analysis, for example, includes material from underfeeding as "Secondary Supply." However, ERI does not consider how a change in uranium concentrate and/or conversion prices would affect the price of SWU or the level of underfeeding present in secondary supply.

enrichment and uranium markets will significantly affect how DOE's material affects uranium market prices.

2. *Realized prices of current operators*

ERI states that realized price varies from one company to another. To estimate the realized prices for U.S. producers, ERI gathered information from public filings representing approximately 95% of U.S. production. 2015 ERI Report, 60–61. ERI does not list the specific dollar figures, but it provides a graph of how realized uranium prices have changed over time for several U.S. producers. This graph shows that realized prices declined for most primary producers in 2014. Even with this decline, ERI estimates that several producers achieved realized prices in 2014 well above the average spot price over the course of the year. At least one producer achieved a realized price well above the average term price for 2014. 2015 ERI Report, 61.

ERI reports that some mining companies have negotiated contracts that base the price paid at least partially on a fixed or base-escalated pricing mechanism. As an example, ERI reports that Cameco has reported that the price sensitivity of its current contract portfolio is about 50% of any change in spot market price. ERI estimates that less than 30% of U.S. production currently comes from companies that are effectively unhedged against changes in spot price. 2015 ERI Report, 60–61.

TradeTech also provides its estimates of the decline in realized price for several producers—both U.S. and foreign. Although TradeTech does not provide specific figures, it provides information on several firms in chart form. It appears from the chart that among the firms for which TradeTech provides estimates, realized prices in 2013 varied from as low as about$38 to as high as about$57. For most producers, there was a decline in realized price

between 2011 and 2013. The magnitude of that decline ranges from approximately $12 to as low as $2 or $3. TradeTech Report, 13. TradeTech notes that one reason for declining realized prices is the expiration of long-term contracts signed when prices were substantially higher. TradeTech Report, 12.

NAC similarly notes that some higher cost suppliers have locked in higher prices through fixed price contracts that allow them to realize prices greater than current market prices. NAC Report, 3-22. NAC also provides its estimated supply capability broken down by production cost. The specific figures are withheld from the public version of the NAC Report to protect confidential information. NAC Report, 3-9 to 3-11. Although NAC estimates the effect of DOE transfers on market price, as described above, NAC does not provide specific estimates of the effect on the price realized by individual producers.

EIA reports several figures that are relevant to the prices realized by current production facility operators. EIA reports that the weighted average price in sales directly from U.S. producers in 2013 was $44.65. EIA, 2013 Uranium Production Report, 7 (2014). Similarly, EIA reports that the weighted average price paid by U.S. reactor operators in 2013 was $51.99 per pound U_3O_8 equivalent (per lb U_3O_8). EIA, 2013 Uranium Marketing Report, 4 (2014). EIA provides comparatively more information on the price paid by U.S. reactor operators. Although EIA does not provide a complete range of prices, it does report that the bottom 7.1 million pounds U_3O_8 equivalent (approximately 1/8th of uranium delivered in 2013) purchased by U.S. operators had a weighted average price of $34.34. The top 7.1 million pounds had a weighted average price of $72.62.[23] EIA, 2013 Uranium Marketing Report, 26. EIA also provides

[23] These two figures do not differentiate between U.S.-origin versus foreign material. However, EIA reports that the weighted average price of U.S. origin material is higher than the average for all foreign material. EIA, 2013 Uranium Marketing Report, 20 (2014).

average prices broken down by origin—foreign vs. U.S.—and by seller—U.S. producer, U.S. brokers and traders, other U.S. suppliers (i.e. other reactor operators, converters, enrichers, or fabricators), and foreign suppliers. The weighted average price in 2013 for U.S. origin uranium was $56.37 per lb U_3O_8. The weighted average price in 2013 from U.S. brokers and traders was $50.44. For 2013, EIA does not report the weighted average price of uranium purchased by U.S. reactor operators directly from U.S. producers to avoid disclosure of individual company data. However, in recent years when that value is reported, it has been above the average price paid for U.S. origin uranium. EIA, 2013 Uranium Marketing Report, 4 (2014). For comparison, DOE notes that the 2013 average spot price was around $39.00 and the average term price was around $54.00.[24]

EIA provides data about sales using different pricing mechanisms. EIA reports that of the approximately 23.3 million pounds U_3O_8 equivalent purchased by U.S. reactor operators from domestic sources[25] and delivered in 2013, 14.5 million pounds were purchased based on fixed or base-escalated pricing—approximately 62.3%—with a weighted-average price of $54.95. Approximately 3.6 million pounds were purchased based purely on spot-market pricing—approximately 15.6%—with a weighted-average price of $42.55. The remaining 5.1 million pounds—approximately 22%—was sold based on some other pricing mechanism with a weighted average price of $52.68. EIA, Uranium Marketing Report, 24 (2014).

[24] As calculated according to monthly price indicator data from UxC.
[25] Note that EIA's figure includes purchases of U.S.-origin uranium as well as purchases from a firm located in the United States. Therefore, this number includes uranium from sources other than the domestic uranium industry. EIA reports that approximately 9.5 million pounds of U.S. origin uranium was delivered to U.S. reactor operators in 2013. EIA, Uranium Marketing Report, 20 (2014).

3. *Production at existing facilities*

ERI reports that U.S. production has risen since the DOE uranium inventory transfers in December 2009. In 2014, production was 5% higher compared to the previous year. However, ERI reports that production in 2015 is expected to decline to 2013 levels. 2015 ERI Report, 58. Since 2009, four new operations have begun production: Willow Creek in 2010, Hobson/Palangana in late 2010/early 2011, Lost Creek in 2013, and Nichols Ranch in 2014. ERI also reports that one additional production center is expected to begin operations in 2015. Despite these new operations, ERI notes that several conventional and in-situ leach operations have scaled back operations. 2015 ERI Report, 57.

After reporting this information, ERI presents a chart showing the price levels at the time cutbacks were announced at various U.S. suppliers. ERI reports price points for four operations: $45 per pound in the spot market for conventional mines in Utah; $40 per pound in the spot market for two in-situ-leach operations; and $35 per pound in the spot market for additional conventional mines and a uranium mill. 2015 ERI Report, 62.

ERI then estimates average production costs for existing mines by referring to EIA's published data on production expenditures across the uranium industry. Using a three year average to smooth out year-to-year differences, ERI notes that average production costs have remained fairly constant since 2009 at about $40 per pound. 2015 ERI Report, 63. ERI further reports that it estimates production costs at U.S. in-situ-leach facilities to range from the low $30s to the mid $40s per pound. ERI concludes that the pattern of cutbacks and estimated production costs "do not seem to indicate that adding back the $3 per pound price effect attributed to all DOE inventory material for Scenario 1 would move current prices enough to cause U.S. producers to ramp well field development and production activities back up." 2015

ERI Report, 64. ERI further notes that the spot price would remain near $40 per pound and "may still not be sufficient for higher cost ISL producers to restart well field development or higher cost conventional mines to resume mining activities, and likely would not have prevented the decisions to cut back when prices declined to $35/lb in mid 2013 and then below $30/lb in mid 2014." 2015 ERI Report, 64.

The 2014 ERI Report came to similar conclusions using similar methodology. That report noted that despite the overall increase in uranium production in recent years, there have been production cuts at several operations. 2014 ERI Report, 49. ERI also provided a chart of production cut announcements and the then-current spot and term prices. 2014 ERI Report, 58. ERI noted that some uranium producers report costs in public filings, but these costs are not reported consistently across firms and generally do not include royalties and severance taxes or the cost of ongoing wellfield development at in-situ-leach operations. ERI's estimate of average industry-wide production costs is the same as in the 2015 ERI Report—i.e. approximately $40 per pound. 2014 ERI Report, 59.

TradeTech predicts a "potential reduction in the number of market participants." TradeTech Report, 21. It then applies the price effect it estimates for DOE transfers to a hypothetical uranium producer with a production cost of $47.41 per pound. See Figure 15 of TradeTech Report, 22. TradeTech does not apply its estimate to any particular producer. TradeTech does, however, provide estimates for the production costs of several firms in both 2011 and 2013.[26] Although TradeTech does not provide specific cost data, it does provide information on several firms in chart form. It appears from the chart that among the firms TradeTech provides estimates for, production costs in 2013 varied from as low as $30 to as high

[26] This figure includes information on some projects that are not part of the domestic uranium mining industry, such as Uranium One's Kazakh projects.

as $50. TradeTech also notes that many producers have been able to reduce or stabilize costs in recent years. This is also reflected in the difference between the producers' costs in 2011 and in 2013. TradeTech Report, 13.

As noted above, NAC provides estimated production cost ranges for segments of current supply, but it does not directly estimate the effect of DOE transfers on production levels. NAC Report, 3-9 to 3-11.

UxC does not provide any specific estimates of production levels or costs at currently operating facilities. However, in other reports, UxC outlines detailed estimates for individual mines. UxC Uranium Market Outlook – Q4 2014, 76–78 (2014); UxC Uranium Production Cost Study, 80–84 (Aug. 2013).

In addition to the information described above, DOE has considered information from EIA reports. EIA reports on production in the domestic uranium industry on a quarterly and annual basis. EIA's most recent quarterly report provides preliminary data for 2014. U.S. primary production in 2014 stood at 4.9 million pounds U_3O_8. This is about 5% higher than in 2013 and 15% higher than in 2012. In fact, this represents the highest production total in any calendar year since 1997. EIA, Domestic Uranium Production Report Q4 2014, 2 (January 2015). The same number of uranium concentrate processing facilities—seven—operated in 2014 as in 2013. EIA reports that the White Mesa conventional mill halted production in the fourth quarter of 2014 and that the Nichols Ranch in-situ-leach plant began operation in the second quarter of 2014. EIA Domestic Uranium Production Report Q4 2014, 3–6 (January 2015).

4. *Employment levels in the industry*

DOE has considered information contained from EIA reports relating to employment in the domestic uranium production industry. EIA's most recent Uranium Production Report states

that employment stood at 1,156 person-years in 2013, 1,196 person-years in 2012, and 1,191 person-years in 2011. EIA, 2013 Uranium Production Report, 10 (May 2014).

In its analysis, ERI compared EIA's employment figures with changes in uranium spot and term prices. Based on a statistical correlation, ERI infers that employment responds to changes in price. 2015 ERI Report, 73. ERI then uses this correlation to estimate that the decrease in uranium prices over the course of 2014 resulted in a loss of 114 person-years from the 2013 value of 1,156. 2015 ERI Report, 55. ERI then estimates that the price effect it attributes to DOE transfers lowered employment by 41 person years in 2013, and 44 person years in 2014. 2015 ERI Report, 56. ERI further estimates that price effects due to DOE transfers at the levels described in Scenario 1 would result in an average employment loss of 42 person years over the next 10 years. For Scenario 2 and 3, ERI estimated that the average employment loss would be 39 and 21 person years, respectively. Again, it is important to note that this estimate is not a prediction that the uranium production industry under Scenario 1 would shed 42 jobs in 2015 and each subsequent year. Instead, this figure reflects ERI's estimate that total employment in the industry would be higher by an average of 42 person-years without DOE transfers compared to with DOE transfers.

For the 2014 ERI Report, ERI conducted a similar analysis and came to broadly similar conclusions. It estimated an employment loss of 50 person-years for 2013, and an average loss of 44 person years over the course of 2014-2023. 2014 ERI Report, 48.

Though no commenter provided specific numbers, several referred to decreases in employment in recent years caused by decreases in uranium prices. E.g., Comment of Mark S. Pelizza, at 1. Some commenters stated that the uranium production industry has lost half its workforce since May 2012 without providing supporting data. Comment of UPA, at 2; comment

of Uranerz, at 2. Although several stated that DOE transfers were causing a portion of these losses, no commenter estimated the proportion of recent employment decreases attributable to DOE transfers. TradeTech Report, 21–22; UxC Report, 5.

5. *Changes in capital improvement plans and development of future facilities*

As stated above, ERI reports that four new production centers began operation since 2009: one in 2010, one in late 2010/early 2011, one in 2013, and one in 2014. In addition, one new production center—Peninsula's Lance—is expected to begin operations in 2015. 2015 ERI Report, 57. ERI explains that the new production centers may have been able to begin operations only because they were supported by fixed price term contracts that were signed when prices were substantially higher than they are currently—i.e. $55 to $70 per pound term price. At least one of these companies has directly stated that its project would not have been able to proceed at current price levels—$45 to $50 per pound term price. ERI also reports that some owners of proposed conventional mines outside the U.S. have stated that prices in the range of $60 to $70 per pound would be necessary for further development. 2015 ERI Report, 61.

Based on the above, ERI concludes, "[i]t does not appear that removing the DOE inventory from the market and adding back the $2 to $3 per pound price effect attributed to the DOE inventory material . . . would necessarily increase current prices enough to change the situation regarding the viability of new production centers in the U.S." 2015 ERI Report, 62. However, ERI reports that some lower cost ISL projects in the U.S. may be able to move forward at current prices. 2015 ERI Report, 62.

The 2014 ERI Report came to similar conclusions. 2014 ERI Report, 57. It noted that despite the overall increase in uranium production in recent years, there have been production cuts at several operations. 2014 ERI Report, 49. ERI also reported the same prices that it

believed would be required to motivate further development as it reports the 2015 report. 2014 ERI Report, 57.

NAC provides estimates of the site forward cost including rate of return for ten properties it considers to be under development.[27] The specific figures are withheld from the public version of the NAC Report to protect confidential information. NAC Report, 3-11 to 3-12. NAC does not directly apply its estimate of the price effect of DOE transfers to the production costs for these specific properties.

EIA reports that production expenditures were $168.8 million in 2011, $187 million in 2012 and $168 million in 2013—when spread across annual production, these numbers represent approximately $41 per pound in 2011, $43 per pound in 2012 and $36 per pound in 2013. EIA, 2013 Domestic Uranium Production Report, 7, 11 (2014). Including costs related to drilling between 2009 and 2013 raises this figure by about $10-15 per pound, and including land, exploration, and reclamation costs in those years increases these figures by a further $19-24 per pound. EIA, 2013 Domestic Uranium Production Report, 7, 11 (2014).

EIA also provides a table of different facilities and their operating statuses. EIA reports one uranium mill in development as of the 4th quarter 2014—in the "permitted and licensed" stage. EIA, Domestic Uranium Production Report Q4 2014, 4 (January 2015). EIA reports eight in-situ-leach plants under development—two in the "developing" stage, three that are "partially permitted and licensed," two that are "permitted and licensed," and one that is "under construction." EIA, Domestic Uranium Production Report Q4 2014, 5–6 (January 2015).

[27] NAC defines "under development" as a property for which ground breaking has begun. Note that NAC considers ten properties worldwide to be "under development"; they are not limited to U.S. properties. NAC Report, 3-11.

6. *Long-term viability and health of the industry*

As described above, ERI notes that US industry production has risen since the start of DOE uranium inventory barters in December 2009. ERI also notes that four new operations began production since 2009, and one additional production center is expected to begin operations in 2015. 2015 ERI Report, 57.

ERI also presents its future expectations regarding demand for uranium. ERI's most recent Reference Nuclear Power Growth forecasts project global requirements to grow to approximately 182 million pounds annually between 2018 and 2020, approximately 15% higher than current requirements. Global requirements are expected to continue to rise to a level of 203 million pounds in 2025, approximately 28% higher than current requirements. 2015 ERI Report, 6–7. ERI presents a graph comparing global requirements, demand, and supply from 2013 – 2035. That graph shows that global secondary supply and supply from current mines will continue to exceed global reactor demand until approximately 2018. However, if China's practice of purchasing amounts of uranium well in excess of its current reactor demand is included—what ERI terms "Discretionary Strategic" demand—global demand approximately equals supply from secondary supply and currently operating mines. 2015 ERI Report, 9–10. If planned expansions and new mines under development are included, supply is expected to exceed demand until approximately 2024, regardless of whether "Discretionary Strategic" demand is included.[28] In the time period following 2025, ERI's graph shows demand significantly outstripping supply. 2015 ERI Report, 9. In order to meet this demand, ERI anticipates that mines it terms "planned" and "prospective" will need to begin operations. 2015 ERI Report, 11.

[28] ERI assumes that China's discretionary strategic inventory building will taper off by 2023. 2015 ERI Report, 10.

A variety of other sources predict substantial increases in reactor requirements and/or demand.[29] TradeTech reports reactor-only growth at 3.52% per year through 2024. Total uranium requirements growth is much slower during this period due to stock building purchases which taper downward.[30] TradeTech Report, 34. The OECD and IAEA report that reactor requirements are expected to grow by at least 35.4 million pounds[31] by 2025—representing approximately 21% of 2015 requirements.[32] OECD-IAEA, Uranium 2014: Resource, Production, and Demand, 105 (2014). In its Uranium Market Outlook for the 4th quarter of 2014, UxC similarly predicts significant increases in both requirements and demand in the long-term. UxC Uranium Market Outlook – Q4 2014, 56–60 (2014).

In addition to a predicted increase in demand, several sources predict a recovery in either spot or term uranium prices—or both. ERI notes that term prices are expected to increase in the future, but does not provide a specific forecast. 2015 ERI Report, 46. ERI's econometric model, however, does show an increase in the spot price. Specifically, ERI's chart forecasts that spot prices will recover over the course of 2015–2018 eventually settling in the $52-57 range after 2019. 2015 ERI Report, 52. TradeTech's forecasted Exchange Value predicts an increase in spot price to approximately $50 as early as June 2016, even with DOE transfers. TradeTech Report, 20. UxC's estimates of the effect of DOE transfers assume that market conditions will improve in the medium term. Specific price levels are withheld from Figures 5 and 6 of the

[29] DOE notes that uranium "demand" and reactor "requirements" are different. Requirements refers to an estimate of the amount of uranium needed to support operating reactors in a particular year. Demand includes additional purchased quantities for strategic or discretionary purposes. For example, in recent years China has purchased quantities of uranium far in excess of its reactor requirements. 2015 ERI Report, 10–11; TradeTech Report, 41–42; NAC Report, 3-2 to 3-5.

[30] TradeTech's charts appear to assume China's stock building purchases will cease to outpace Chinese requirements around 2023. TradeTech Report, 41–42.

[31] Converted from metric tons uranium in U_3O_8 (MTU) using a conversion rate of 2,599.79 pounds U_3O_8 per MTU.

[32] This represents OECD-IAEA's low growth scenario. The high growth scenario anticipates growth of almost 90 million pounds, approximately 50% above the high-growth scenario for 2015. *Id.*

public version to protect confidential information. UxC Report, 10–11. In its annual Uranium Market Outlook, UxC provides a more detailed explanation of its price forecast, which generally predicts an increase in price over the next 10 years. UxC Uranium Market Outlook – Q4 2014, 111–19 (2014).

Finally, DOE recognizes that the predictability of transfers from its excess uranium inventory over time is important to the long-term viability and health of the uranium industries. ERI has noted the importance of predictability "for long-term planning and investment decisions by the domestic industry." 2015 ERI Report, 100; 2014 ERI Report, 60–61. Some commenters also stated that DOE transfers should be predictable. Comment of UPA, at 2; comment of Cameco, at 2. DOE notes that the upper scenario considered by ERI would represent continued transfers at rates consistent with the May 2014 determination and roughly similar to the May 2012 determination. Compare 2015 ERI Report, 25, with 2014 ERI Report, 28.

B. Uranium Conversion Industry

1. *Market prices*

In its analysis, ERI estimates the effect of DOE transfers on the market prices for conversion services. To estimate this effect, ERI employed a market clearing price model very similar to what is described above for the uranium market. As with uranium concentrates, ERI constructed individual supply and demand curves for conversion services and estimated the clearing price with and without DOE transfers. 2015 ERI Report, 44. A summary of ERI's estimates of the effect of DOE transfers on the conversion price appears in Table 5.

Applying this approach to the three scenarios listed above, ERI estimates that DOE transfers at the rate of 2,705 MTU per year would cause the price of conversion services to be, on average, $0.90 lower between 2015 and 2024—with prices being $0.90 lower in 2015 and

2016 specifically. 2015 ERI Report, 45. For DOE transfers at a rate of 1,855 MTU per year, ERI estimates that prices would be, on average, $0.80 lower between 2015 and 2024—with prices being $0.70 and $0.60 lower in 2015 and 2016, respectively. If DOE ceased transfers under these two programs, ERI estimates that prices would be, on average, $0.40 lower between 2015 and 2024—with prices being $0.10 and $0.00 lower in 2015 and 2016, respectively.[33] As with uranium concentrates, this is not a prediction that prices will drop by the specified amount once DOE begins transfers. According to ERI's analysis, a level of price suppression consistent with the estimate for Scenario 1 is already reflected in the current market price for conversion services. 2015 ERI Report, 44. If DOE continues transferring at Scenario 1 levels, the market prices would not change; if DOE began transferring at Scenario 2 levels, the market price would be expected to rise by approximately $0.20; if DOE ceased transfers under these programs, market prices would be expected to rise by $0.80. See Table 4.2 of 2015 ERI Report, 45.

ERI compares these numbers to the current spot and term price indicators published by TradeTech on January 31, 2015—i.e. $8.50 per kgU as UF_6 on the spot market, and $16.00 per kgU as UF_6 on the term market. As a percentage of the current prices, the average price effect attributable to DOE's transfers over the period 2015-2024 under Scenario 1 represents approximately 10.6% of the current spot price and 5.6% of the current term price. Under Scenario 2, the average price effect over the same period represents 9.9% of the spot price and 5.2% of the term price. Under Scenario 3, the average price effect represents 5.0% of the spot price and 2.7% of the term price. 2015 ERI Report, 47, 49.

[33] As noted above, the transfer rates for these scenarios refer only to the level of uranium transfers for cleanup at Portsmouth and downblending of LEU. The level of transfers for other DOE programs is the same in all three scenarios.

For the 2014 ERI Report, ERI conducted a similar market clearing approach for a level of transfers that is equal to Scenario 1 of the 2015 ERI Report. Although that report used slightly older data, the results are very similar. Notably, ERI estimated that the price effect attributable to DOE transfers at the current rates is $0.90 between 2014 and 2023—with prices being $0.90 lower in 2014, 2015, and 2016.[34] 2014 ERI Report, 40.

	2015 ERI Report	**2014 ERI Report**
	Estimated Price Effect (2015–2024)	**Estimated Price Effect (2014–2023)**
Scenario 1	$0.90	$0.90
Scenario 2	$0.80	-
Scenario 3	$0.40	-

Table 5. ERI's Estimate of Effect of DOE Transfers on Conversion Spot and Term Prices in $ per kgU as UF_6

In addition to its estimate of the price effect of DOE transfers on the uranium concentrate market, TradeTech estimates the effect on the price of conversion services. A summary of TradeTech's estimates appears in Table 6. It appears that TradeTech developed this estimate using its econometric Dynamic Pricing Model. TradeTech Report, 14. Using its model, TradeTech estimates that DOE's transfer reduced the spot price by an average of $2.13 per kgU as UF_6 between January 2012 and December 2014. TradeTech Report, 17. TradeTech also estimates that continued DOE transfers at current rates would reduce the spot price by an average of $0.91 per kgU as UF_6 between January 2015 and December 2016. TradeTech Report, 21.

TradeTech also provides estimates for the effect of DOE transfers of several decreased transfer rates. If DOE transfers decreased to 75% of current levels, TradeTech estimates that the spot price would increase by an average of $0.21 per kgU as UF_6 between January and 2015 and

[34] ERI also compared those numbers to then current term and spot price indicators as of March 31, 2014. At that time, the TradeTech price indicator was $7.50 per kgU as UF_6 on the spot market and $16.00 per kgU as UF_6 on the term market. 2014 ERI Report, 23.

December 2016. TradeTech, 31.[35] Based on TradeTech's estimate of the price suppression of DOE transfers at current levels, it appears that TradeTech is estimating that price suppression at 75% of current levels would be $0.70. If DOE transfers decreased to 50% of current levels, TradeTech estimates that the spot price would increase by an average of $0.43 per kgU as UF_6 between January and 2015 and December 2016. TradeTech, 30. This corresponds to a price suppression of $0.48. If DOE transfers decreased to 25% of current levels, TradeTech estimates that the spot price would increase by an average of $0.66 per kgU as UF_6 between January and 2015 and December 2016. TradeTech, 29. This corresponds to a price suppression of $0.25.

TradeTech Report	
Transfer Rate (compared to current)	**Estimated Price Effect (2015–2016)**
100%	$0.91
75%	$0.70
50%	$0.48
25%	$0.25

Table 6. TradeTech's Estimate of Effect of DOE Transfers on Conversion Spot Price in $ per kgU as UF_6

UxC's U-PRICE and SWU-PRICE econometric models predict the markets' reaction to changes in supply for the uranium concentrate and enrichment industries. UxC does not directly model the conversion services market. Instead, UxC relies on other evidence to conclude that the price effect of DOE transfers on spot conversion prices have been "at least equal to, if not greater than, the impact on spot uranium prices." Specifically, UxC notes that much of the world's spot conversion is sold in conjunction with uranium through contracts for UF_6. UxC also notes that over the past few years the UF_6 price has fallen as much as the U_3O_8 price has on

[35] Figures 21–24 of the TradeTech Report show TradeTech's estimates for the price impact at a range of different transfer rates. Although these charts and the related text refer to "Transfers at [25, 50, or 75] Percent of Established 2014 Volumes," it appears that these charts actually reflect an estimate for a 25%, 50%, or 75% *decrease* relative to current levels, rather than transfers at the specified percentage of current levels.

a percentage basis. Finally, UxC notes that the Ux North American UF_6 Price has been below the Ux NA UF_6 value (i.e. the sum of spot uranium and spot conversion prices for a given quantity of UF_6) over most of the period of DOE transfers. UxC Report, 15. With respect to the future effect of DOE transfers, UxC expects that DOE transfers will continue to have a similar effect on spot conversion prices and a somewhat less but still "noticeable" effect on term conversion prices. UxC Report, 16.

2. *Realized prices of current operators*

ERI does not provide in either report a specific estimate of the change in ConverDyn's realized price due to DOE transfers. However, ERI does note that ConverDyn's realized price is believed to have increased over the past decade, although ERI says unit costs have increased as well. ERI bases its sales revenue assumptions on a sale price of $14 per kgU. This estimate appears to be based predominately on claims by the company that it is operating at a loss. 2015 ERI Report, 70; 2014 ERI Report, 70.[36]

No commenter provides specific information about the current realized prices achieved in the conversion industry, and no commenter directly estimates the effect of DOE's transfers on realized prices. However, some information relevant to ConverDyn's realized price is publicly available.

ConverDyn has stated in the past that the conversion market generally relies on long-term contracts. Declaration of Malcolm Critchley, *Converdyn v. Moniz*, Case no. 1:14-cv-01012-RBW, Document 7-3, at ¶ 37 (June 23, 2014); see also UxC Conversion Market Outlook – December 2014, 27–28, 32 (2014). Traxys has stated that ConverDyn specifically sells

[36] It appears that ERI developed this assumption based on its estimate of ConverDyn's production costs of $15 per kgU. Since ConverDyn claims to be operating at a loss, ERI assumes that its realized price must be lower. 2015 ERI Report, 70.

conversion services "almost exclusively" on long-term contracts. Declaration of Kevin P. Smith, *ConverDyn v. Moniz,* Case no. 1:14-cv-01012-RBW, Document 17-7, at ¶ 16 (July 7, 2014). Traxys has also stated that ConverDyn exercises significant pricing power in the market. Traxys refers to a 2011 letter from ConverDyn to its customers notifying them that it would not sell conversion services for less than $16.50 per kgU. *Id.* Since then, the term price indicator for conversion services has remained remarkably stable, even as spot prices for conversion have fluctuated. 2015 ERI Report, 12.

DOE does not have complete information regarding the pricing structure of conversion services contracts. ConverDyn has stated in the past that the conversion market generally relies on long-term contracts that are "linked, at least in part, to market prices at the time of the contract." Declaration of Malcolm Critchley, *Converdyn v. Moniz,* Case no. 1:14-cv-01012-RBW, Document 7-3, at ¶ 37 (June 23, 2014). Although it is common practice for long-term contracts for U_3O_8 to include a non-fixed element that depends on market prices at the time of delivery, it is unclear to what extent this practice is prevalent in the conversion industry.

In addition to the above, ConverDyn's comment also refers to a document it submitted to DOE in March 2014 that provides some additional information on ConverDyn's contracting practices. Comment of ConverDyn, Enclosure, at 5 n.12. That document was submitted with a request that it be treated as containing proprietary information. Letter from Malcolm Critchley, ConverDyn, to Peter B. Lyons, DOE (March 10, 2014). DOE may consider this document in its deliberations.

3. *Production at existing facilities*

There is only one existing conversion facility in the United States, the Metropolis Works facility (MTW) operated by Honeywell International. ConverDyn is the exclusive marketing

agent for conversion services from this facility. Comment of ConverDyn, at 1; 2015 ERI Report, 64. The nominal capacity of the Metropolis Works facility is 15 million kgU as UF_6. However, the facility generally operates below that level. 2015 ERI Report, 65. Based on statements from ConverDyn, ERI estimates that production at this facility was approximately 11 million kgU as UF_6 per year prior to the loss of sales associated with Fukushima. Because ConverDyn has stated that this volume loss was approximately 25%, ERI estimates current sales volume at 8.25 million kgU as UF_6. 2015 ERI Report, 65.

In estimating the effect of DOE transfers on ConverDyn's sales volume, ERI assumes that 50% of the material used for cleanup at Portsmouth and 100% of all other DOE material enters the U.S. market. 2015 ERI Report, 65–66. Based on statements from ConverDyn, ERI assumes that ConverDyn's share of the U.S. market for conversion services is 25% and that its share of the international market is 16%. 2015 ERI Report, 68. A summary of ERI's estimates of the effect of DOE transfers on ConverDyn's sales volume appears in Table 7. Using the assumptions described above, ERI estimates that under Scenario 1, DOE transfers decrease ConverDyn's market volume by 0.67 million kgU, or 7.5%. Under Scenario 2, ERI estimates that DOE transfers decrease ConverDyn's market volume by 0.46 million kgU, or 5.3%. Under Scenario 3, ERI estimates that DOE transfers decrease ConverDyn's market volume by 0.08 million kgU, or 1%. 2015 ERI Report, 69–70. As with ERI's price estimates discussed above, these estimates do not suggest that were DOE to transfer uranium in accordance with Scenario 1, ConverDyn would lose the predicted volume of sales. DOE has been transferring at or above the rate of Scenario 1 for nearly three years. On ERI's analysis, the estimated effect has already occurred. Transfers in accordance with Scenario 1 would continue the effect, and transfers in

accordance with Scenario 2 or 3 would lead to an increase in ConverDyn's sales volume, of the amount ERI predicts.

	Volume (million kgU)	Percent Change
Scenario 1	0.67	7.5%
Scenario 2	0.46	5.3%
Scenario 3	0.08	1%

Table 7. ERI's Estimate of Decrease in ConverDyn's Sales Volume

Based on its estimate of the effect on ConverDyn's sales volume, ERI also estimates the change in production costs at Metropolis Works due to DOE transfers. A summary of ERI's estimates of the effect of DOE transfers on ConverDyn's production costs appears in Table 8. ERI analyzes two scenarios based on slightly different assumptions about the amount of ConverDyn's costs that are variable. Specifically, ERI calculates production costs based on 80% and 100% fixed costs. 2015 ERI Report, 70.

ERI assumes that ConverDyn's production cost would be $15 per kgU if DOE material was not being introduced into the market. Assuming 100% of Metropolis Works' costs are fixed, DOE transfers would not affect total production costs, but they would increase per unit costs. Specifically, ERI estimates that DOE transfers at the level under Scenario 1 increase production costs to $16.2 per kgU, about 8% higher than without DOE transfers. Transfers at the level under Scenario 2 would cause Metropolis Works production costs to be $15.84, about 5.6% higher than without DOE transfers. Under Scenario 3, production costs would be $15.15, about 1% higher than without DOE transfers. 2015 ERI Report, 70. If 80% of Metropolis Works' costs are fixed, total production costs would be lower with DOE transfers, but per unit production costs would also be lower. Under Scenario 1, production costs would be $15.97, about 6.5% higher than without DOE transfers. Under Scenario 2, production costs would be $15.68, about

4.5% higher than without DOE transfers. Under Scenario 3, production costs would be $15.12, about 1% higher than without DOE transfers. 2015 ERI Report, 71.

	80% fixed		100% fixed	
	Cost (per kgU)	**Percent Change**	**Cost (per kgU)**	**Percent Change**
Scenario 1	$15.97	6.5%	$16.20	8%
Scenario 2	$15.68	4.5%	$15.84	5.6%
Scenario 3	$15.12	1%	$15.15	1%

Table 8. ERI's Estimate of Increase in ConverDyn's Production Cost

The 2014 ERI Report conducted a similar analysis using slightly different assumptions regarding ConverDyn's pre-Fukushima production and current market share. Specifically, ERI calculated the effect of DOE transfers assuming two different pre-Fukushima production levels: 10 million kgU and 12 million kgU. With these assumptions, ERI estimated ConverDyn's current sales volume at 7.50 million kgU and 9.00 million kgU respectively. 2014 ERI Report, 66, 68. ERI also calculated the effect of DOE transfers assuming two different assumptions about ConverDyn's share of the U.S. Market: 25% and 30%. 2014 ERI Report, 65–66. Based on these assumptions ERI estimates that DOE transfers decrease ConverDyn's market volume by between 0.60 and 0.72 million kgU. 2014 ERI Report, 66, 68. This represents between 6.9% and 8.1% of ConverDyn's estimated sales volume. 2014 ERI Report, 67, 69.

On production cost, ERI similarly estimates based on 80% and 100% fixed costs. As with sales volume, ERI conducts this calculation twice: once assuming a volume of 7.50 million kgU, and once assuming a volume of 9.00 million kgU. For the 7.50 million kgU scenario, ERI estimates that if production costs are 100% fixed, DOE transfers cause unit production costs to increase about 8% to $16.20 per kgU. If production costs are 80% fixed, DOE transfers cause unit production costs to increase about 6.4% to $15.96 per kgU. For the 9.00 million kgU

scenario, ERI estimates that production costs would increase by 7.8% for 100% fixed costs and 6.2% for 80% fixed costs. 2014 ERI Report, 70–71.

ConverDyn's comment in response to the RFI does not provide a separate estimate of the effect of DOE transfers on its sales volume. ConverDyn refers to the relevant sections of the 2014 ERI report regarding its sales volume and production costs. Comment of ConverDyn, Enclosure, at 5. With respect to the 2014 ERI Report, ConverDyn does not refute or confirm the assumptions ERI used in its analysis regarding ConverDyn's sales volume, market share, or production costs. ConverDyn's comment also refers to a document it submitted to DOE in March 2014. Comment of ConverDyn, Enclosure, at 5 n.12. That document was submitted with a request that it be treated as containing proprietary information. Letter from Malcolm Critchley, ConverDyn, to Peter B. Lyons, DOE (March 10, 2014). That document provides estimates of the effect of DOE transfers on ConverDyn's sales volume and profits, but it does not provide financial information demonstrating that those effects have occurred or supporting analysis explaining why a given change in ConverDyn's sales or revenue should be attributed to DOE transfers. *Id.* DOE may consider this document in its deliberations.

In addition to the above, ConverDyn notes in its comment that the Metropolis Works facility ceased production beginning in January 2015 for a period of approximately three months—two months longer than usual. ConverDyn states that this was necessitated by "the continued depressed state of the conversion market." Although ConverDyn refers to the displacement of conversion sales by DOE's transfers, it acknowledges that DOE's transfers are not the sole cause of the lengthening of Metropolis Works facility's annual shutdown. ConverDyn does not include supporting data or otherwise provide a proportionate breakdown of

the impact of DOE material versus other factors in causing this shutdown. Comment of ConverDyn, Enclosure, at 4.

The UxC Report does not provide estimates for production levels or production costs at individual facilities, but its report does note that the cost for primary producers is "known to be in the range of $10–$15/kgU." UxC Report, 15. In a separate publication, UxC provides more detailed estimates of both current production levels and projected future production for individual facilities. Market share can be determined by comparing production levels to those of other primary producers and secondary sources. UxC Conversion Market Outlook – December 2014, 45–47 (2014).

Traxys provides some information relevant to DOE's analysis of the assumptions ERI uses in its calculations. Traxys explains that in selling material obtained from Fluor-B&W Portsmouth, it pursues a goal to sell at least 50% of the material to non-U.S. customers. Traxys states that it has consistently met this goal. Comment of Traxys, at 1. Traxys further explains that in 2014 no more than 40% of DOE-derived material was sold in the U.S. market. Comment of Traxys, at 2. This is similar to the amount of conversion that Traxys has separately stated went to the U.S. market in prior years. Traxys stated in July 2014 that 42% of DOE-derived conversion entered the U.S. marketplace during calendar year 2013. Declaration of Kevin P. Smith, *ConverDyn v. Moniz*, Case no. 1:14-cv-01012-RBW, Document 17-7 at ¶11 (July 7, 2014).

4. *Employment levels in the industry*

ERI notes that Metropolis Works restarted after an extended shutdown in summer 2013 with approximately 270 employees. Prior to the 2012-2013 shutdown, ERI estimates that the facility employed approximately 334 people. As this change coincided with a change in long-

term production volume, ERI concludes that is unlikely that 100% of Metropolis Works' production costs are fixed. 2015 ERI Report, 72–73; 2014 ERI Report, 71. Although it does not provide specific estimates, ERI states that "[a] portion of the reduction in work force at Metropolis Works may be associated with the introduction of DOE inventory into the market." However, ERI also notes that several other factors likely played a part as well. 2015 ERI Report, 73; 2014 ERI Report, 72. ConverDyn does not provide a separate estimate of decreased employment levels due to DOE transfers; instead ConverDyn referred to the relevant sections of the 2014 ERI Report. Comment of ConverDyn, Enclosure, at 5.

5. *Changes in capital improvement plans and development of future facilities*

Neither ERI nor any of the commenters provide an estimate of the effect of DOE transfers on new facility development or capital improvement plans. However, DOE understands that several conversion services companies are undertaking these or related activities.

Although there are several large-scale development projects currently planned or underway outside the United States—namely AREVA's COMURHEX II modernization project and TVEL's plan for a new facility at SCC—DOE is not aware of any such plans in the United States. See Eileen Supko & Thomas Meade, "New facilities are on the horizon," *Nuclear Engineering International* (Oct. 6, 2014), available at http://www.neimagazine.com/features/featurenew-facilities-are-on-the-horizon-4394892; UxC Conversion Market Outlook – December 2014, 50, 56–57, 73 (2014).

Metropolis Works has, however, undertaken substantial capital expenditures at its existing facility in recent years. Honeywell has stated that it has invested "nearly $177 million over the past 10 years in capital improvements, including $50 million in safety projects."

"About Us," Honeywell, http://www.honeywell-metropolisworks.com/about-us.[37] Some of these upgrades came during an extended shutdown in 2012 and 2013, in which Metropolis Works made upgrades to ensure the facility could withstand extreme natural disasters. These changes were made under an agreement with NRC in response to an inspection NRC conducted in the wake of the Fukushima disaster in Japan. "Honeywell and U.S. Nuclear Regulatory Commission Reach Agreement on Necessary Upgrades to Metropolis Nuclear Conversion Facility," News Release (Oct. 16, 2012), available at http://www.honeywell-metropolisworks.com/?document=oct-16-2012-press-release-honeywell-and-u-s-nuclear-regulatory-commission-reach-agreement-on-necessary-upgrades-to-metropolis-nuclear-conversion-facility&download=1.

In terms of future plans, Metropolis Works announced in November 2014 that it would be shutting down for approximately 90 days beginning in early January 2015. Honeywell noted that it would use the extended shutdown to make updates and capital improvements. Jim Pritchett, Honeywell Metropolis Works, Letter to Employees (Nov. 20, 2014), available at http://www.honeywell-metropolisworks.com/?document=letter-to-employees-23&download=1; see also Comment of ConverDyn, Enclosure, at 4. Honeywell has further stated that the company plans to spend $17.5 million in improvements during 2015. Jim Pritchett, Honeywell Metropolis Works, Letter to Employees (Jan. 30, 2014), available at http://www.honeywell-metropolisworks.com/?document=letter-to-employees-24&download=1.

[37] Letters from Honeywell management include similar numbers. A November 20, 2014, letter included identical figures. Jim Pritchett, Honeywell Metropolis Works, Letter to Employees (Nov. 20, 2014), available at http://www.honeywell-metropolisworks.com/?document=letter-to-employees-23&download=1. Older letters provided slightly different figures. Jim Pritchett, Honeywell Metropolis Works, Letter to Community (Dec. 19, 2013), available at http://www.honeywell-metropolisworks.com/?document=letter-to-the-community-from-new-metropolis-works-plant-manager&download=1.

6. *Long-term viability and health of the industry*

ERI's most recent Reference Nuclear Power Growth forecasts project global requirements to grow to approximately 67.2 million kgU by 2020, approximately 20% higher than current requirements. Global requirements are expected to continue to rise to a level of 91.4 million kgU by 2035, approximately 63% higher than current requirements. 2015 ERI Report, 13. ERI presents a graph comparing global requirements, demand, and supply from 2013 – 2035. That graph forecasts that global secondary supply and supply from primary converters will continue to exceed global demand until at least 2025. Beyond that point, supply generally keeps pace with growth in requirements. 2015 ERI Report, 14.

Although not focused on conversion, the requirements forecasts noted above in section III.A.6 are also relevant to the conversion industry. In general, requirements and/or uranium concentrate demand forecasts should also apply to demand for conversion services. However, there may be some small differences due to strategic and discretionary inventory building. For example, China has been purchasing strategic supply well in excess of its requirements. Those purchases have come in the form of U_3O_8. 2015 ERI Report, 13. Thus, these purchases affect near-term uranium concentrate demand, but do not affect near-term conversion demand.

No other commenter provided specific projections about future conversion requirements, demand, or prices. However, DOE has some additional information not submitted in response to the RFI. In its December 2014 Conversion Market Outlook, UxC predicts significant increases in both requirements and demand in the long-term. UxC Conversion Market Outlook – December 2014, 40, 44 (2014). UxC also provides a more detailed explanation of its price forecast, which generally predicts an increase in price over the next 10 years. UxC Conversion Market Outlook – December 2014, 82, 85 (2014).

Finally, as with uranium concentrates, DOE recognizes that the predictability of transfers from its excess uranium inventory over time is important to the long-term viability and health of the uranium conversion industry. Again, DOE notes that the upper scenario considered by ERI would represent continued transfers at rates consistent with the May 2012 and May 2014 determinations. Compare 2015 ERI Report, 25, with 2014 ERI Report, 28.

C. Enrichment Industry

1. *Market prices*

In its analysis, ERI also estimated the effect of DOE transfers on the market prices for enrichment services. To estimate this effect, ERI employed a market clearing price model similar to what is described above for the uranium market. As with uranium concentrates and conversion, ERI constructed individual supply and demand curves for enrichment services and estimated the clearing price with and without DOE transfers. 2015 ERI Report, 44. A summary of ERI's estimates of the effect of DOE transfers on the market price for SWU appears in Table 9.

Applying this approach to the three scenarios listed above, ERI estimates that DOE transfers at the rate of 2,705 MTU per year would cause the price of enrichment services to be, on average, $4.50 lower between 2015 and 2024—with prices being $5.90 and $3.80 lower in 2015 and 2016 specifically. 2015 ERI Report, 46. For DOE transfers at a rate of 1,855 MTU per year, ERI estimates that prices would be, on average, $3.60 lower between 2015 and 2024—with prices being $5.10 and $3.00 lower in 2015 and 2016 specifically. If DOE ceased transfers under these two programs, ERI estimates that prices would be, on average, $1.70 lower between

2015 and 2024—with prices being $3.20 and $1.70 lower in 2015 and 2016 specifically.[38] As with uranium concentrates, this is not a prediction that prices will drop by the specified amount once DOE begins transfers pursuant to a new determination. According to ERI's analysis, a level of price suppression consistent with the estimate for Scenario 1 is already reflected in the current market price for conversion services. If DOE continued transferring at Scenario 1 levels, the market prices would not change; if DOE began transferring at Scenario 2 levels, the market price would be expected to rise by approximately $0.80; if DOE ceased transfers under these programs, market prices would be expected to rise by $2.70. See Table 4.3 of 2015 ERI Report, 46.

ERI compares these numbers to the current spot and term price indicators published by TradeTech on January 31, 2015—i.e. $88.00 per SWU on the spot market, and $90.00 per SWU on the term market. As a percentage of the current prices, the average price effect attributable to DOE's transfers over the period 2015-2024 under Scenario 1 represents approximately 5.1% of the current spot price and 5.0% of the current term price. Under Scenario 2, the average price effect over the same period represents 4.1% of the spot price and 4.0% of the term price. Under Scenario 3, the average price effect represents 1.9% of the spot price and 1.9% of the term price. 2015 ERI Report, 48, 50.

For the 2014 ERI Report, ERI conducted a similar market clearing approach for a level of transfers that is equal to Scenario 1 of the 2015 ERI Report. Although that report used slightly older data, the results are similar. Notably, ERI estimated that the price effect attributable to

[38] As noted above, the transfer rates for these scenarios refer only to the level of uranium transfers for cleanup at Portsmouth and downblending of LEU. The level of transfers for other DOE programs is the same in all three scenarios.

DOE transfers at the current rates is $4.00 between 2014 and 2023—with prices being $5.20, $5.70, and $3.60 lower in 2014, 2015, and 2016, respectively.[39] 2014 ERI Report, 40.

	2015 ERI Report	2014 ERI Report
	Estimated Price Effect (2015–2024)	**Estimated Price Effect (2014–2023)**
Scenario 1	$4.50	$4.00
Scenario 2	$3.60	-
Scenario 3	$1.70	-

Table 9. ERI's Estimate of Effect of DOE Transfers on Enrichment Spot and Term Prices in $ per SWU

In addition to its estimate of the price effect of DOE transfers on the uranium concentrate market, UxC estimates the effect on the price of enrichment services using its proprietary U-PRICFE and SWU-PRICE models. UxC Report, 5. As with its uranium concentrate estimates, UxC estimates the impact using two different methodologies, an "incremental approach" and a "total impact approach."

Using its incremental approach, UxC estimates that between 2012 and 2014 DOE's transfers reduced the spot price by an average of $7.49 per SWU and the term price by an average of $5.37 per SWU. Using its total impact approach, UxC estimates that between 2008 and 2014 DOE's transfers reduced the spot price by an average of $9.19 per SWU and the term price by an average of $6.96 per SWU. UxC Report, 8–9.

UxC also estimates the effect of DOE continued transfers at current rates for the period 2015 to 2030. A summary of UxC's estimates of the effect of DOE transfers on future enrichment prices appears in Table 10. UxC estimates that DOE transfers in the near and medium terms would reduce the spot price by an average of $5.31 per SWU. UxC projects that

[39] ERI also compared those numbers to then current term and spot price indicators as of March 31, 2014. At that time, the TradeTech price indicator was $96.00 per SWU on the spot market and $99.00 per SWU on the term market. 2014 ERI Report, 23.

this effect will change slightly in the medium term as market prices start to recover. Specifically, DOE transfers will reduce the spot price between 2018 and 2030 by an average of $4.86 per SWU. UxC also notes that the former number is larger relative to the expected price of enrichment than the latter number (5.9% versus 3.8%). UxC Report, 12. UxC estimates that DOE transfers in the near and medium terms would reduce the term price by an average of $5.50 per SWU. Between 2018 and 2030, DOE transfers are estimated to reduce the term price by an average of $5.00 per SWU. Again, the near and medium term impact is larger in relation to the expected price (5.6% versus 3.6%). UxC Report, 11.

UxC Report		
	Near- & Mid-term Price Effect	**Long-term Price Effect**
Spot Price	$5.31	$4.86
Term Price	$5.50	$5.00

Table 10. UxC's Estimate of Effect of DOE Transfers on Enrichment Spot and Term Prices in $ per SWU

As mentioned above, a change in market prices for uranium concentrates and conversion services may also affect enrichers. URENCO has stated that at a small amount of its capacity is devoted to underfeeding. Comment of URENCO, at 3. ERI notes that URENCO estimates it is using 10-15% of its capacity for underfeeding. 2015 ERI Report, 75. Thus, to the extent that URENCO utilizes or resells the natural uranium hexafluoride that results from underfeeding, the market prices for uranium and conversion could be relevant to its business decisions.

2. *Realized prices of current operators*

There is only one currently operating enrichment facility in the United States, the URENCO USA (UUSA) gas centrifuge facility in New Mexico. No commenter provides information about the realized price achieved by URENCO or the effect of DOE transfers on that price. However, other sources provide some relevant information.

In recent years, the vast majority of SWU has been sold on the term market. UxC Enrichment Market Outlook – Q4 2014, 17, 20 (2014). ERI estimates that more than 95% of enrichment requirements are covered under long-term contracts. 2015 ERI Report, 74. Even in the term market, contracting volume is down compared to levels prior to 2010. UxC Enrichment Market Outlook – Q4 2014, 9, 21 (2014). Long-term contracts for SWU last for 10 or more years, in some cases and in some cases 15 or more years. UxC Enrichment Market Outlook – Q4 2014, 100 (2014).

EIA reports that in 2013, the average price paid for SWU was $142.22. EIA, Uranium Marketing Report, 7 (2014). This is well above the average market prices for 2013, approximately $110 in the spot market and $120 in the term market according to UxC.

URENCO's most recent financial statements indicate that at least a portion of its contract portfolio "extend beyond 2025." URENCO Limited, Interim Financial Statements for the 6 Months Ended 30 June 2014, at 6, available at http://www.urenco.com/_/uploads/content-files/Urenco_Group_Interim_Accounts_to_30_June_2014-final-02092014.pdf.[40] URENCO has also stated that its enrichment contracts are usually fixed base price with escalation leaving URENCO with "no direct exposure to uranium prices." URENCO Investor Update, 4 (Sept. 9, 2014), available at http://www.urenco.com/_/uploads/results-and-presentations/URENCO_Bond_Investor_Presentation_2014.pdf. Given the above considerations, it seems likely that URENCO's realized price based on its current contract portfolio is as much as 50% higher than the current spot and market prices. Since many of URENCO's contracts appear to have been entered before DOE began transfers comparable to the

[40] DOE notes that URENCO's financial statements have referred to its order book as "extending up to and beyond 2025" at least since 2010. See URENCO, Annual Report & Accounts 2010, at 3 (2010), available at http://media.urenco.com/corp-website/298/annualreportandaccounts2010_1.pdf.

current levels, it is unlikely that continued DOE transfers will have an impact on the realized price achieved for enrichment services from existing capacity at UUSA during the period contemplated for the planned determination.

As noted above, URENCO has stated that a small amount of its capacity is devoted to underfeeding. Comment of URENCO, at 3.[41] ERI notes that URENCO estimates it is using 10-15% of its capacity for underfeeding. 2015 ERI Report, 75. To the extent that URENCO sells the natural uranium hexafluoride yielded from underfeeding, DOE transfers could affect its revenues to the extent the transfers cause decreases in the prices for uranium concentrates and conversion services.

3. *Production at existing facilities*

URENCO reports that the nameplate capacity for the UUSA facility is 3.7 million SWU. Comment of URENCO, at 1. URENCO has also stated that construction of additional centrifuges will continue until the facility reaches 5.7 million SWU. "About Us, URENCO USA," URENCO, http://www.urenco.com/about-us/company-structure/urenco-usa (accessed Feb. 21 2015).

Due to the nature of gas centrifuges, it is highly unlikely that UUSA will decrease production of SWU. As URENCO states, due to the low level of electricity required to run the centrifuges, slowing production would have almost no effect on operating expenses. Furthermore, stopping and restarting a centrifuge may damage the equipment. Comment of URENCO, at 3.

[41] On May 22, 2014, URENCO submitted an application to the U.S. NRC to amend its license for the facility to allow it to use high assay tails (approximately 0.4% U^{235}) as feed material. See 79 FR 43099 (July 24, 2014); "Redacted – Supplement to License Amendment Request for Capacity Expansion of URENCO USA Facility (LAR-12-10)," Letter from URENCO to U.S. NRC, LES-14-00071-NRC (June 17, 2014).

4. *Employment levels in the industry*

ERI does not provide an estimate of the change in employment due to DOE transfers in the enrichment industry. No commenter references changes in employment in the enrichment industry. URENCO states that its business is essentially fixed-cost and makes no reference to changes in employment.

5. *Changes in capital improvement plans and development of future facilities*

URENCO recently completed "Phase II" of its expansion plans, bringing the capacity of its facility to 3.7 million SWU. "Phase II Completion," URENCO (Apr. 9, 2014), http://www.urenco.com/news/detail/phase-ii-completion (accessed Feb. 22, 2014). URENCO is continuing to move forward with "Phase III" expansion, which will bring plant capacity to approximately 5.7 million SWU. URENCO notes that it has slowed its plan for construction of additional capacity. Comment of URENCO, at 3. URENCO expects to reach 5.7 million SWU capacity by 2023. URENCO Investor Update, 31 (Sept. 9, 2014). Although the company has requested a license amendment that would allow it to expand capacity to 10 million SWU per year, URENCO states that this move is "to provide for future licensing flexibility should the market recover." URENCO notes that it cancelled construction of "Phase IV" in 2013. Comment of URENCO, at 3.

DOE is aware of several other planned or proposed enrichment facilities in the U.S., namely, AREVA's Eagle Rock Enrichment Facility in Idaho, Centrus Energy's—formerly USEC Inc.—American Centrifuge Plant in Piketon, OH, and Global Laser Enrichment's facility

in Wilmington, NC.[42] Development of each of these facilities has been put on hold or slowed until market prices improve.

The Eagle Rock Enrichment Facility would use gas centrifuge technology and would have a capacity of approximately 3.3 million SWU. "Eagle Rock Enrichment Facility," AREVA, http://us.areva.com/EN/home-203/eagle-rock-enrichment-facility.html (accessed Feb. 21, 2015). After announcing several delays in construction, AREVA stated in May 2013 that it was no longer projecting a start date for building the facility. "French company won't set date for Idaho nuclear facility," The Oregonian (May 23, 2013), http://www.oregonlive.com/pacific-northwest-news/index.ssf/2013/05/french_company_wont_set_date_f.html (accessed Feb. 21, 2015). At the time of this announcement, the term market price for SWU was approximately $130, according to UxC's monthly price indicator.

The proposed American Centrifuge Plant would use gas centrifuge technology and would have a capacity of approximately 3.8 million SWU. "USEC Inc. Gas Centrifuge," U.S. NRC, http://www.nrc.gov/materials/fuel-cycle-fac/usecfacility.html (accessed Feb. 22, 2015). Active construction of new centrifuges has ceased. In a November 2013 quarterly filing with the SEC, Centrus Energy, then known as USEC, stated, "[a]t current market prices USEC does not believe that its plans for American Centrifuge commercialization are economically viable without additional government support." USEC Form 10-Q, Securities and Exchange Commission, at 10 (Nov. 5, 2013) https://www.sec.gov/Archives/edgar/data/1065059/000106505913000049/usu-2013930x10q.htm (accessed Feb. 22, 2015). When this form was submitted to the SEC, the term market price for SWU was approximately $115, according to UxC's monthly price indicator.

[42] Although not the subject of this determination, DOE notes that ERI analyzed the possible future transfer to GLE of high-assay depleted uranium. 2015 ERI Report, 27–28. As this transaction would involve reenrichment of depleted tails, it would tend to support additional demand for enrichment services.

Global Laser Enrichment, a venture of GE-Hitachi and Cameco, has proposed an enrichment plant that would use laser enrichment technology developed by Silex Systems, an Australian company. The proposed facility in Wilmington, NC would have a capacity of about 6 million SWU. GLE License Application, Rev. 7, U.S. NRC, Docket 70-7016, at 1-16 (August 20, 2012), available at http://pbadupws.nrc.gov/docs/ML1224/ML12242A227.pdf. In July 2014, GLE announced that it would slow continued development of the facility "in line with current and future market realities." "Global Laser Enrichment," GE-Hitachi, https://nuclear.gepower.com/fuel-a-plant/products/gle.html (accessed Feb. 22, 2015). At the time of GLE's announcement, the term market price for SWU was approximately $95, according to UxC's monthly price indicator.

6. *Long-term viability and health of the industry*

ERI's most recent Reference Nuclear Power Growth forecasts project global requirements to grow to approximately 59 million SWU between 2021 and 2025, approximately 31% higher than current requirements. Global requirements are expected to continue to rise to a level of 74 million SWU between 2031 and 2035, approximately 64% higher than current requirements. 2015 ERI Report, 13. ERI presents a graph comparing global requirements, demand, and supply from 2013 – 2035. That graph shows that global supply will continue to significantly exceed global demand over the long term. 2015 ERI Report, 16.

Although not focused on enrichment, the requirements forecasts noted above in section III.A.6 are also somewhat relevant to the enrichment industry. In general, requirements and/or uranium concentrate demand forecasts should also apply to demand for low enriched uranium. As with conversion, there may be some small differences due to strategic and discretionary inventory building. For example, China has been purchasing strategic supply well in excess of

its requirements. Those purchases have come in the form of U_3O_8. 2015 ERI Report, 13. Thus, these purchases affect near-term uranium concentrate demand, but do not affect near-term demand for LEU.

In addition to demand for LEU, higher demand for uranium concentrates can affect demand for enrichment because of the relationship described above between natural uranium and enrichment as inputs for producing enriched uranium product. In the medium to long term, supply from current mines will cease to exceed demand. Meanwhile, requirements for LEU will continue to significantly exceed enrichment supply. As prices for uranium concentrates and conversion increase relative to SWU prices, it may become more economical to re-enrich high-assay tails. In this vein, ERI suggests that enrichers will continue to redirect capacity to underfeeding and that Rosatom will continue to re-enrich tails. 2015 ERI Report, 16.[43]

No other commenter provides specific projections about future enrichment requirements, demand, or prices. In its Uranium Enrichment Outlook for the 4th quarter of 2014, UxC predicts significant increases in both requirements and demand in the long-term. UxC Enrichment Market Outlook – Q4 2014, 36, 38 (2014). UxC also provides a more detailed explanation of its price forecast, which generally predicts an increase in price over the next 10 years. UxC Enrichment Market Outlook – Q4 2014, 91–94 (2014).

Finally, as with uranium concentrates and conversion services, DOE recognizes that the predictability of transfers from its excess uranium inventory over time is important to the long-term viability and health of the uranium enrichment industries. Again, DOE notes that the upper

[43] Again, DOE notes that although it is not included in ERI's chart of enrichment supply, GLE's proposed Paducah Laser Enrichment Facility would represent additional enrichment supply that is not intended to be devoted to producing LEU. Compare 2015 ERI Report, 16, with 2015 ERI Report, 27–28.

scenario considered by ERI would represent continued transfers at rates consistent with the May 2012 and May 2014 determinations. Compare 2015 ERI Report, 25, with 2014 ERI Report, 28.

IV. Request for Comments

DOE believes it will be possible to identify a rate of transfers that will not have an adverse material impact on domestic uranium industries. DOE therefore proposes to issue a new Secretarial Determination, pursuant to 3112(d) of the USEC Privatization Act, that transfers of uranium for cleanup services at the Portsmouth Gaseous Diffusion Plant and for down-blending of HEU to LEU will not have an adverse material impact on the domestic production, conversion, or enrichment industry. In preparing this determination, DOE may use the six factors proposed above as an analytical framework for assessing the potential impacts of DOE transfers for each industry.

DOE continues to deliberate over what rate of transfers would be appropriate for such a determination. Commenters suggested a range of options. Many commenters indicated that a rate of 5 million pounds total of natural uranium equivalent per year would be acceptable. Some commenters favored a rate of 5 million pounds but suggested DOE should cease transfers for some period and then ramp up transfers to the 5 million pounds per year rate. One commenter focused on transfers of uranium hexafluoride, as opposed to uranium concentrates, and asked DOE to ensure that its transfers are market-neutral with respect to conversion. DOE is also considering whether to continue transfers at the rate covered by the 2014 determination, 2,705 metric tons per year of natural uranium equivalent.

DOE is also considering whether to include additional features in a determination that might change how a given set of transfers affects domestic industries. Some commenters

proposed a scheme of matched sales, in which DOE would transfer a given tranche of uranium only after ensuring that a buyer had bought an equivalent quantity, at a comparable price, from U.S. producers. Other commenters asked that DOE transfer uranium in such a way that the uranium appears on markets only in the long term. The commenters do not appear to be suggesting that DOE simply not transfer uranium until some future date; rather, they contemplate that DOE would transfer uranium in the near term but with some restriction on use or availability that prevents the uranium from displacing other supply sources for some number of years. Yet the transfers DOE is considering would be part of barter transactions in exchange for services obtained essentially contemporaneously. In considering commenters' suggestions about long-term as compared to short-term availability of DOE-sourced uranium, DOE will need to assess whether the markets could support the provision of services in the near term to be compensated by uranium available only in the long term. In light of the forecast increases in the price of uranium concentrates, it is conceivable that transactions to bridge the gap from near- to long-term could be financially justifiable for some entities. DOE will continue to analyze this possibility.

To enable the Secretary to make a determination as expeditiously as possible, DOE is setting a deadline of April 6, 2015, for all comments to be received. DOE invites all interested parties to submit, in writing, comments and information on the factors described above, the information and documents made available through this notice, and the summary of information considered. DOE intends to make all comments received publicly available. Any information that may be confidential and exempt by law from public disclosure should be submitted as described below.

V. Confidential Business Information

Pursuant to 10 CFR 1004.11, any person submitting information he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery/courier two well-marked copies: One copy of the document marked "confidential" including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. Submit these documents via e-mail or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination. Factors of interest to DOE when evaluating requests to treat submitted information as confidential include: (1) a description of the items; (2) whether and why such items are customarily treated as confidential within the industry; (3) whether the information is generally known by or available from other sources; (4) whether the information has previously been made available to others without obligation concerning its confidentiality; (5) an explanation of the competitive injury to the submitting person which would result from public disclosure; (6) when such information might lose its confidential character due to the passage of time; and (7) why disclosure of the information would be contrary to the public interest.

Issued in Washington, DC, on March 13, 2015.

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[FR Doc. 2015-06189 Filed: 3/17/2015 08:45 am; Publication Date: 3/18/2015]