

**Via Electronic Submission**

January 22, 2015

Mr. David Henderson  
U.S. Department of Energy  
Office of Nuclear Energy  
Mailstop NE-52  
19901 Germantown Road  
Germantown, Maryland 20874-1290

Re: Excess Uranium Management: Effects of DOE Transfers of Excess Uranium on Domestic Uranium Mining, Conversion and Enrichment Industries: Request for Information

Dear Mr. Henderson:

URENCO USA Inc. ("UUSA, Inc.") appreciates the opportunity to submit comments to assist the Department of Energy (DOE) in appropriately managing its excess uranium inventories. These comments are submitted in response to the notice of request for public comments published in the Federal Register on December 8, 2014, and are timely filed in response to the extension of the comment period as published in the Federal Register on December 24, 2014.

UUSA, Inc. is the corporate parent of Louisiana Energy Services, LLC, the licensee and operator of the only working commercial facility producing low enriched uranium in the United States. The UUSA enrichment facility in Lea County, New Mexico, received a combined construction and operating license from the U.S. Nuclear Regulatory Commission in 2006 and began enrichment operations in 2010. UUSA's enrichment capacity currently stands at 3.7 million Separative Work Units (SWU) per year, equivalent to approximately twenty five percent of annual demand for uranium enrichment services by U.S. utilities. This capacity reflects an investment of roughly \$4 billion in U.S. manufacturing.

Uranium enrichment is a key intermediate step in the nuclear fuel cycle in which natural uranium is first mined then converted to uranium hexafluoride, then enriched to increase the concentration of the fissionable U235 isotope, and finally converted into uranium dioxide and fabricated into fuel assemblies for use in nuclear power plants. As the nation's only enricher, we are closely following the Department's management of excess uranium inventories and the potential for negative impacts for the enrichment market specifically. From our position in the middle of the nuclear fuel cycle, UUSA also has a significant interest in the viability and stability of the U.S. industry as a whole.

**URENCO USA Inc.**

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## **The Challenging Enrichment Market**

Gas centrifuge – the technology used by all current global commercial enrichers – is extremely capital intensive in general and even more so when employed at green-field sites such as UUSA. This reality has significant implications for the business case supporting enrichment operations. Our business model is based on an effective partnership with our utility customers that reflects a long-term mutual dependency: utility demand for low enriched uranium (LEU) leads to long-term contracts that underpin the financing needed to build and expand the enrichment facility that produces the LEU needed by the utilities. This model can be disrupted by sustained low market prices caused by either a drop in demand or an increase in available supplies of LEU. In the current market, demand has been significantly eroded due to a number of reactor closures in the post-Fukushima Japanese market, in the United States and elsewhere around the world. New builds have not kept pace with these shut-downs. Similarly enrichment prices are at an all-time low. At year-end 2014, the current long-term price of \$90.00/SWU as reported by industry price reporters The Ux Consulting Company (UxC) and TradeTech, LLC represents the lowest enrichment price ever in real dollar terms.

In its November 2014 update to the *2014 Nuclear Fuel Cycle Supply and Price Report*, Energy Resources International, Inc. (ERI) characterizes the enrichment services market in the following manner: “The spot market price indicator, as reported by TradeTech, declined by \$7/SWU (7%) to \$89/SWU by August, but has held steady since then. The term market price indicator demonstrated similar behavior, declining \$9/SWU (9%) to \$90/SWU by August. Enrichment market contracting activity has continued to be sparse during 2014. Reported spot market activity for 2014 to date is just a few hundred thousand SWU in a handful of transactions. Term transaction volume has been just as dismal and total volume for 2014 is expected to be in the range of 10 million SWU or about 33% lower than 2013. This likely will mark the sixth consecutive year in which term enrichment volumes have declined, and the third year in a row in which contracting volumes have been well below delivery replacement levels.”

ERI further notes, “Supplier contracted backlogs are declining as a result. As noted in the June 2014 ERI Report, buyers are well committed through the year 2020 with very little in the way of open requirements over the next several years. Reactor shutdowns and outages, as well as excess supplier capacity, have resulted in increased inventory levels. The utter lack of sales opportunities continues to force suppliers to match the low spot prices with their term price offers.”

Not only is demand low – and likely to remain so for many years – but massive LEU inventories are present throughout the world and are held by utilities, fabricators, brokers and traders, and by enrichers themselves. In its *Q2 2014 Enrichment Market Outlook*, UxC identifies a global inventory of 82 million SWU of which more than half, 46.4 million SWU, is assumed to be excess. These surplus volumes are essentially equivalent to total current worldwide annual demand for enrichment services. UxC expects these extra quantities to have long-term market impacts: “The ways in which these current excess materials enter the market will vary, but the net impacts are clear: Inventories will suppress current and future demand. Inventories will reduce future SWU contract activity. Inventories will reduce the need for additional SWU capacity and could even cause the demise of one or more new SWU plant projects. Inventories will generally create downward price pressures. Some could come to the market



unpredictably (e.g., if a reactor is closed prematurely), creating greater downward pressure, especially in the spot market.”

In the absence of increased demand generated by Japanese reactor restarts and significant new reactor builds, enrichers have limited means of reducing their own inventories. The nature of the gas centrifuge itself presents a challenge. Given the extremely low levels of electricity required to operate these machines, voluntarily halting production would have essentially zero impact on operating expenses. Further, decelerating centrifuges and running them back up risks damaging these vital assets, thus potentially destroying the entire investment. As such, the volume of enrichment services produced matches nameplate capacity.

Some enrichers have turned, in part, to underfeeding. While small, a portion of UUSA capacity is being used to reserve volumes of natural UF<sub>6</sub> by investing more SWU to produce LEU than SWU paid for by customers. This application of enrichment capability is proscribed by technical limitations but is also equally impacted by low demand and prices in the natural uranium market sector.

In the face of this daunting market, in 2013 UUSA elected to cancel construction of Phase 4 at its New Mexico facility and is drawing out, by many years, completion of Phase 3 which would take the facility to a total capacity of 5.7 million SWU/year.<sup>1</sup>

While the bulk of UUSA’s output is destined for U.S. utility consumption, UUSA is carefully monitoring the potential for increased demand worldwide. UUSA is concerned, however, that significant foreign markets for uranium enrichment services, especially Russia and China, are effectively closed to U.S. exporters.<sup>2</sup> This situation further reduces the outlets for UUSA-enriched material in the current market environment.

Given the fragile state of the enrichment market, the influx of any additional quantities of LEU is a cause for concern. In the analyses underlying the Department’s May 2014 Secretarial Determination, ERI stated that a total of 9.7 million SWU will enter the market during the period 2014 to 2023, with an average annual disbursement of 0.97 million SWU/year. While this volume in real terms may not sound significant, it is equivalent to more than a quarter of UUSA’s total annual production.

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<sup>1</sup> The company is pursuing a license amendment that would, among other changes, expand UUSA production capacity to 10 million SWU/year. This step is intended to provide for future licensing flexibility should the market recover, however a decision to install further capacity would depend utterly on higher demand for enrichment services.

<sup>2</sup> In its June 2014 “2014 Nuclear Fuel Cycle Supply and Price Report,” ERI indicates that the Russian enricher, ROSATOM, “...supplies 100% of the enrichment needs for Soviet designed nuclear power plants in the C.I.S. and 90-95% in Eastern Europe.” Similarly, the Ux Consulting Company notes in its Q4 2014 “Enrichment Market Outlook” that, “With regard to uncovered requirements estimates, it is important to note that while certain countries, such as Russia and China, are included in the total requirements estimates, they are not included when estimating uncovered requirements as it is expected that these countries will cover their internal needs with domestic production.”

Moreover, this annual volume represents a consequential percentage of all worldwide open demand, including an astonishing 72% of all expected unfilled global demand in 2015. The following table reflects the percentage of DOE LEU inventories based on UxC projections of uncovered enrichment requirements through 2023.<sup>3</sup>

Uncovered Enrichment Requirements 2014-2023 (Based on UxC Q4 2014 projections)  
(In millions of SWU)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
U.S.	0.00	0.05	0.70	0.78	1.58	2.01	4.98	6.98	7.03	9.22
Non-U.S.	0.00	1.30	3.42	5.84	7.98	8.56	7.59	10.06	10.08	14.22
Total	0.00	1.35	4.12	6.62	9.57	10.57	12.57	17.04	17.11	23.45
DOE %	N/A	72%	23.5%	14.7%	10.2%	9.2%	7.7%	5.7%	5.7%	4.15%

Even in the outer years when demand hopefully increases, DOE volumes represent a significant source of LEU, putting DOE in direct competition with enrichers.

ERI projected a price impact attributable to DOE inventory entering the enrichment market as an average of \$4 per SWU over the next ten years. A further drop in price would have a significant, deleterious impact on the investment made in New Mexico and more than a chilling effect on any potential future expansion. Without getting into a debate as to what constitutes “fair market value” for DOE, DOE stocks result from long-ago expenditures that were not based on commercially viable rates of return on investment. In contrast, UUSA is a fixed-cost business seeking to recoup its sizable expenses in building its U.S. enrichment facility while also seeking to sustain itself as a robust long-term supplier in line with customer needs and in providing a diverse source of local revenue and jobs in the local community. As such, UUSA is particularly vulnerable to further declines in SWU prices.<sup>4</sup>

### **Factors for Updated DOE Analysis**

In its Request for Information, DOE invites comments on the factors that DOE should consider in assessing whether inventory transfers will have adverse material impacts. UUSA offers the following observations:

- UUSA adheres to a straight-forward reading of the USEC Privatization Act requirements which require the Secretary to determine that, “...the sale of the material *will not have an adverse material impact* on the domestic uranium mining, conversion, or enrichment

<sup>3</sup> The Ux Consulting Company estimates used herein are taken from the company’s Q4 2014 “Enrichment Market Outlook.” As referenced in Footnote 2, UxC has removed Russian and Chinese demand from these estimates.

<sup>4</sup> DOE is not itself immune to the impact of lower prices. Notably, the volume of material bartered to fund down-blend of U.S.-origin highly enriched uranium needs to be increased to accommodate lower-than-expected SWU prices. This has had an impact both on National Nuclear Security Administration down-blending as well as decontamination and decommissioning activity in Portsmouth.



industry..."(emphasis added). The language is clear: the test is whether there is an adverse material impact, not whether such transfers represent the primary or most significant impacts.

- The enrichment services market is a global one. DOE should therefore evaluate impacts on this basis, but should take into account the restricted Russian, Russian-controlled and Chinese markets in modeling forward SWU demand.
- In the face of significant global LEU inventories and moribund demand, DOE should analyze impacts of its inventory releases based on estimates of remaining open demand during the period of investigation, not on total demand including already-committed volumes.
- While the nature of UUSA's business model necessitates long-term contracts, the current lack of differentiation between reported spot and long-term prices suggests that DOE should evaluate the impact of releasing LEU inventories into the market under both spot- and long-term contracting vehicles.
- The U.S. fuel cycle is characterized by few players – a handful of uranium mines, a single converter, and a single enricher. As part of its analysis, DOE should consider how negative impacts on any one of these entities might have spill-over effects on other U.S. fuel cycle companies, thus indirectly causing them harm.
- Given the fragile state of the fuel cycle markets, DOE should under no circumstances consider adding any additional volumes of inventoried material – whether depleted, natural or low enriched – to the scope of current or prospective Secretarial Determinations through 2023.
- DOE should give serious consideration to measures that could mitigate damaging impacts on the U.S. industry.

With regard to mitigation efforts, DOE ideally would agree to withhold LEU releases to the market over the next several years, giving more time for the enrichment sector to stabilize and to more fully internalize the timing and scope of any Japanese reactor restarts and other significant impacts on demand. While we invite DOE to formally analyze this option as part of its new analysis, UUSA also appreciates the challenges before the Department in meeting its programmatic commitments and policy goals absent sufficient annual appropriations.

UUSA is supportive of the broad non-proliferation goals inherent in the National Nuclear Security Administration's down-blending program and likewise recognizes the unique capabilities of DOE's contractor in the ability to handle highly enriched inventories. We therefore propose several alternatives that would allow DOE to reduce the proliferation concerns with these materials without disruption to the processing facility – and without further jolts to the U.S. enrichment industry:

- (1) DOE could increase disbursements of LEU to the American Assured Fuel Supply program, providing an enhanced volume of material to support the commercial nuclear programs of its

trading partners in line with existing and new 123 Agreements in the event of potential disruptions. Funding for such an initiative could be sought as part of the upcoming FY2016 budget request.

- (2) Down-blended LEU could be given to the International Atomic Energy Agency to support establishment of its International Nuclear Fuel Bank and the value of such material could be decremented from planned U.S. financial contributions to the Agency, with the corresponding value hopefully being returned to DOE programs.
- (3) Rather than down-blending to less than 5% <sup>235</sup>U, DOE should actively evaluate blending to a level of roughly 19.75% <sup>235</sup>U. (Alternatively, DOE could analyze down-blending to a range of needed enrichments in the range of 5% <sup>235</sup>U to 19.75% <sup>235</sup>U.)

This latter step would meet non-proliferation goals by reducing the material to a low enriched assay and would allow the contractor to continue this significant work. Further, it would provide a valuable stock of material for U.S. sales to research reactors around the world and would serve to partially mitigate concerns about sufficient supplies in support of further reactor conversions sought by the Administration. The timing of such a step would also be advantageous, as the United States continues planning for the next Nuclear Security Summit to be held in the U.S. during 2016.

Further, a reduction to 19.75% <sup>235</sup>U would underscore the Department's commitment to the development of advanced reactor designs, small modular reactors, and accident tolerant fuels, many of which rely on greater than 5% <sup>235</sup>U enrichments. Having available a ready stock of moderately enriched uranium would allow the developers of these technologies to focus on demonstration and licensing, rather than on initial enrichment supplies, while allowing adequate time for development of a commercial supply chain.

Significantly, stopping down-blending at just below 20% <sup>235</sup>U would also allow DOE to avoid harmful impacts on the nation's only enricher by avoiding further disruptions to the traditional enrichment industry.

UUSA would be pleased to discuss these proposed mitigation measures – as well as any associated process requirements, such as revised NEPA analyses – with the Department in greater detail. Similarly, we welcome any questions or comments on the larger issues raised herein. Please do not hesitate to contact me at any time by email at [mmann@urencoinc.com](mailto:mmann@urencoinc.com), or by phone at 703-682-2508.

Thank you for your consideration of these comments.

Best regards,



Melissa Mann  
President