

**IAEA International Symposium on Uranium Raw Material
for the Nuclear Fuel Cycle**

A Market in Transition



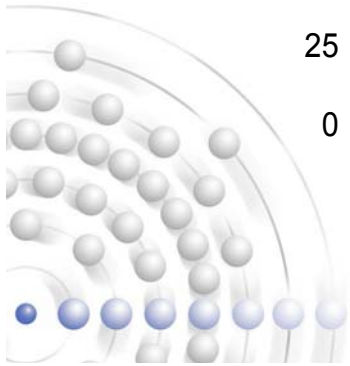
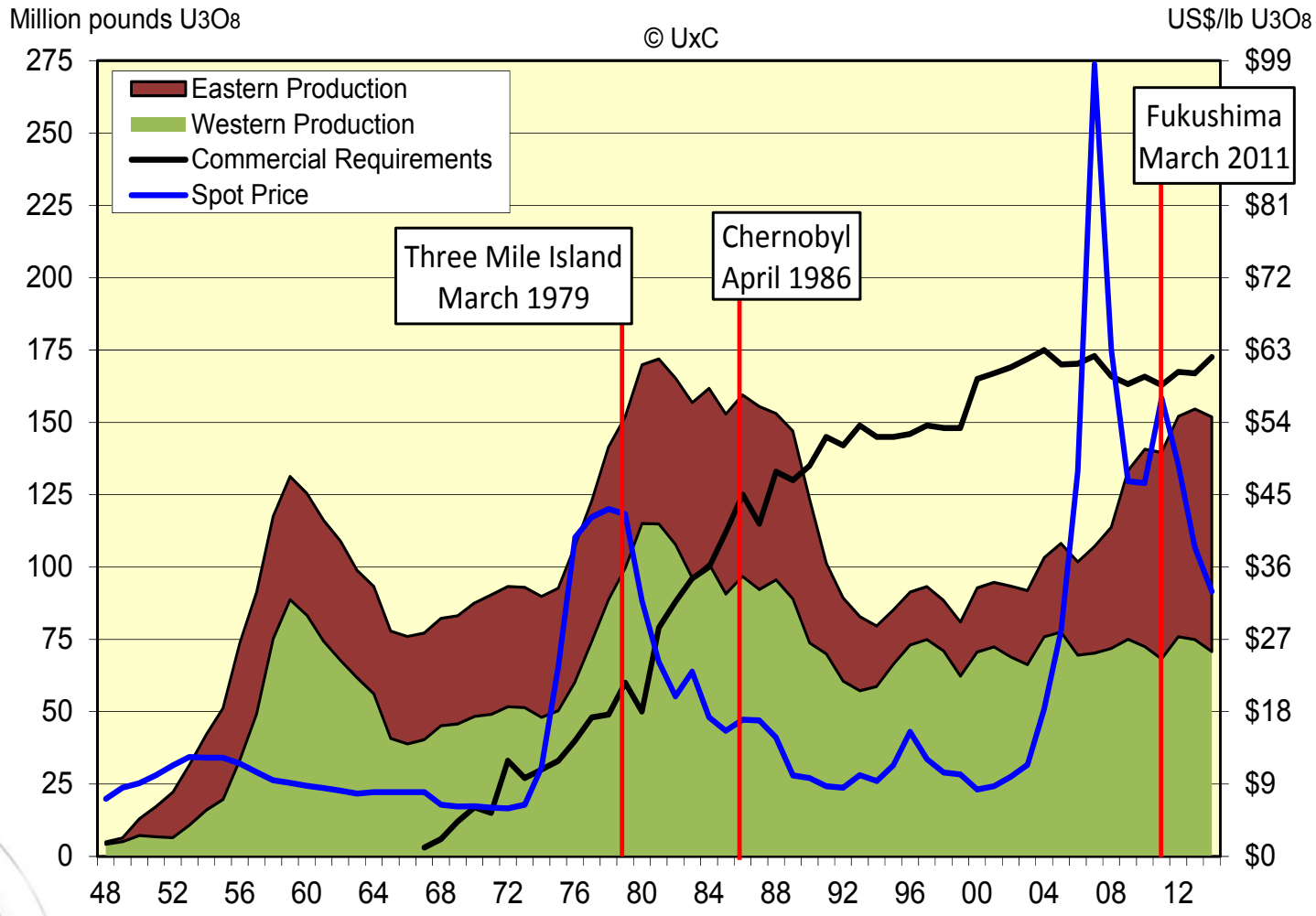
Nick Carter, Senior Vice President

June 27, 2014

The Ux Consulting Company, LLC

www.uxc.com

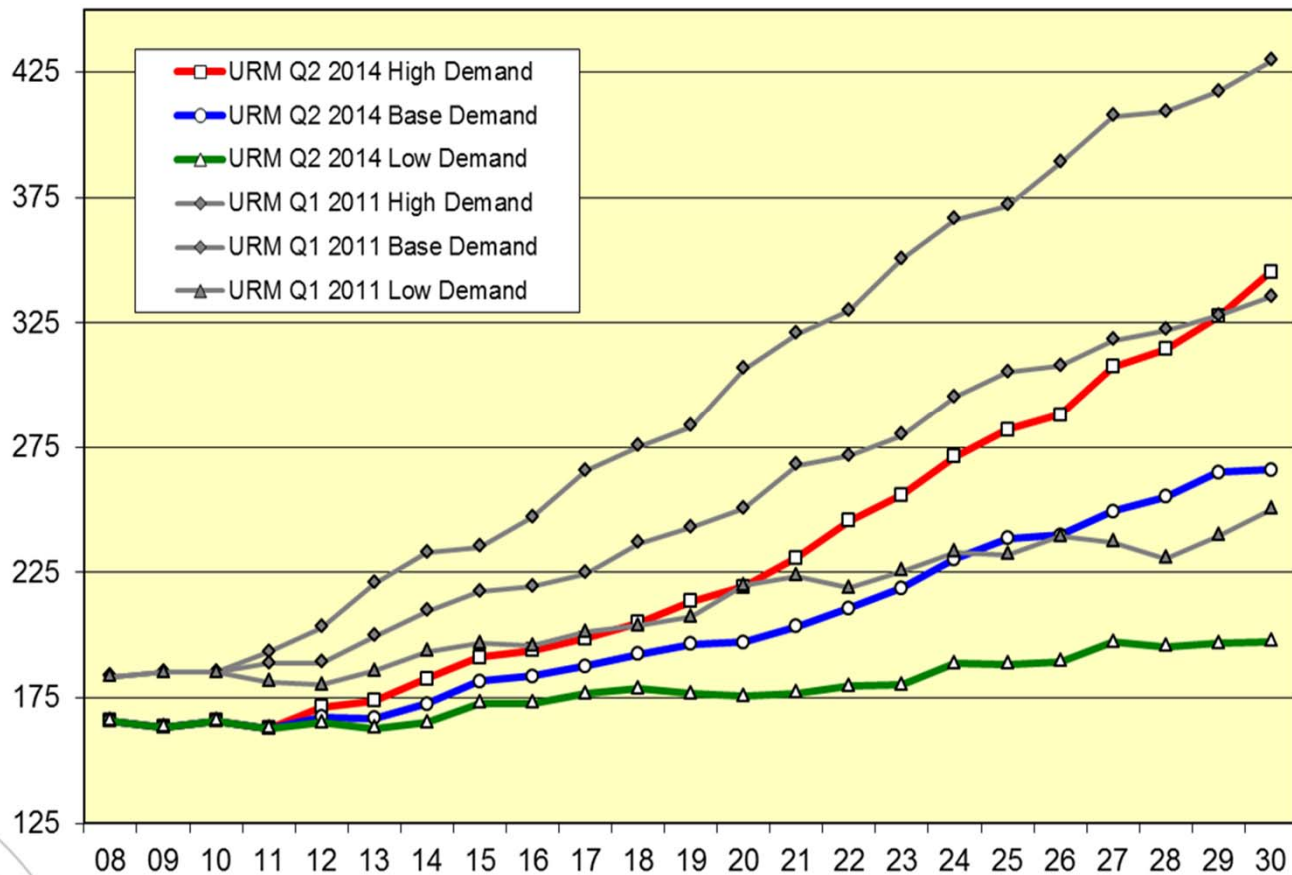
World Uranium Supply & Demand, 1947-2014



Uranium Demand after Fukushima



Million pounds U₃O₈ © UxC

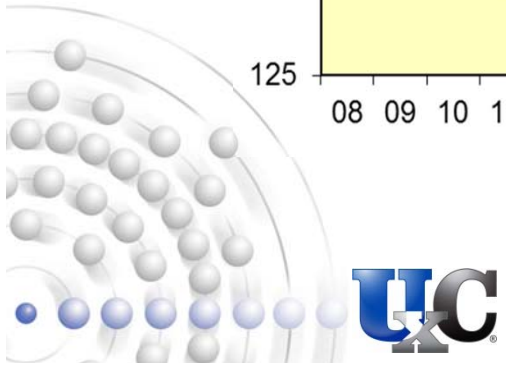


2014 - 18% drop in base case (37 mill. lbs)

2015 - 16% drop in base case (36 mill. lbs)

2020 - 21% drop in base case (53 mill. lbs)

Source: Uranium Market Outlook, Q2 2014

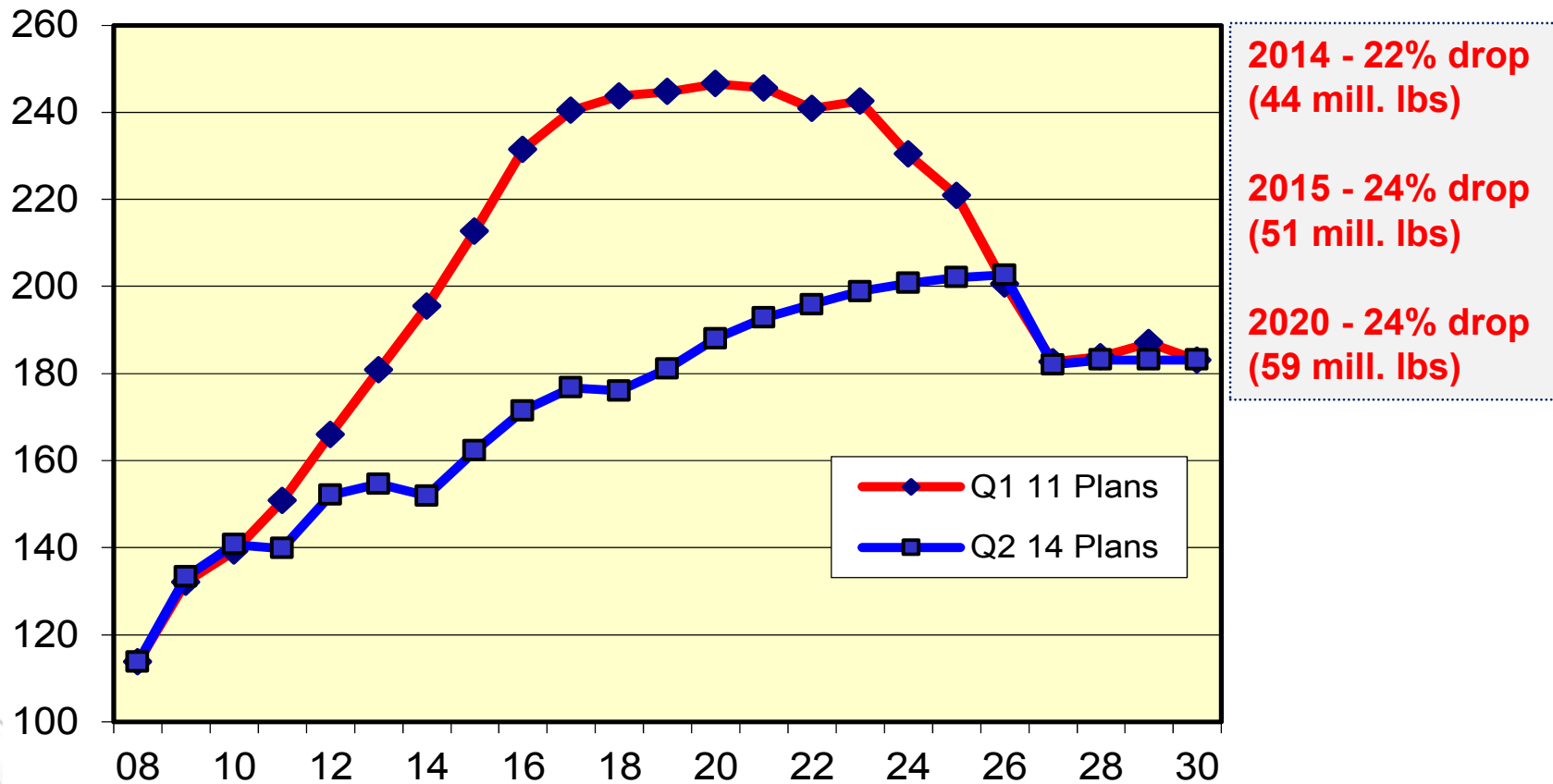


Change in Production Plans – Pre- vs. Post-Fukushima

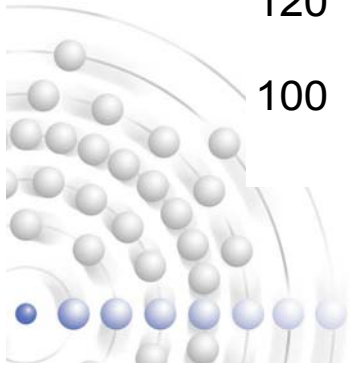


Million pounds U₃O₈

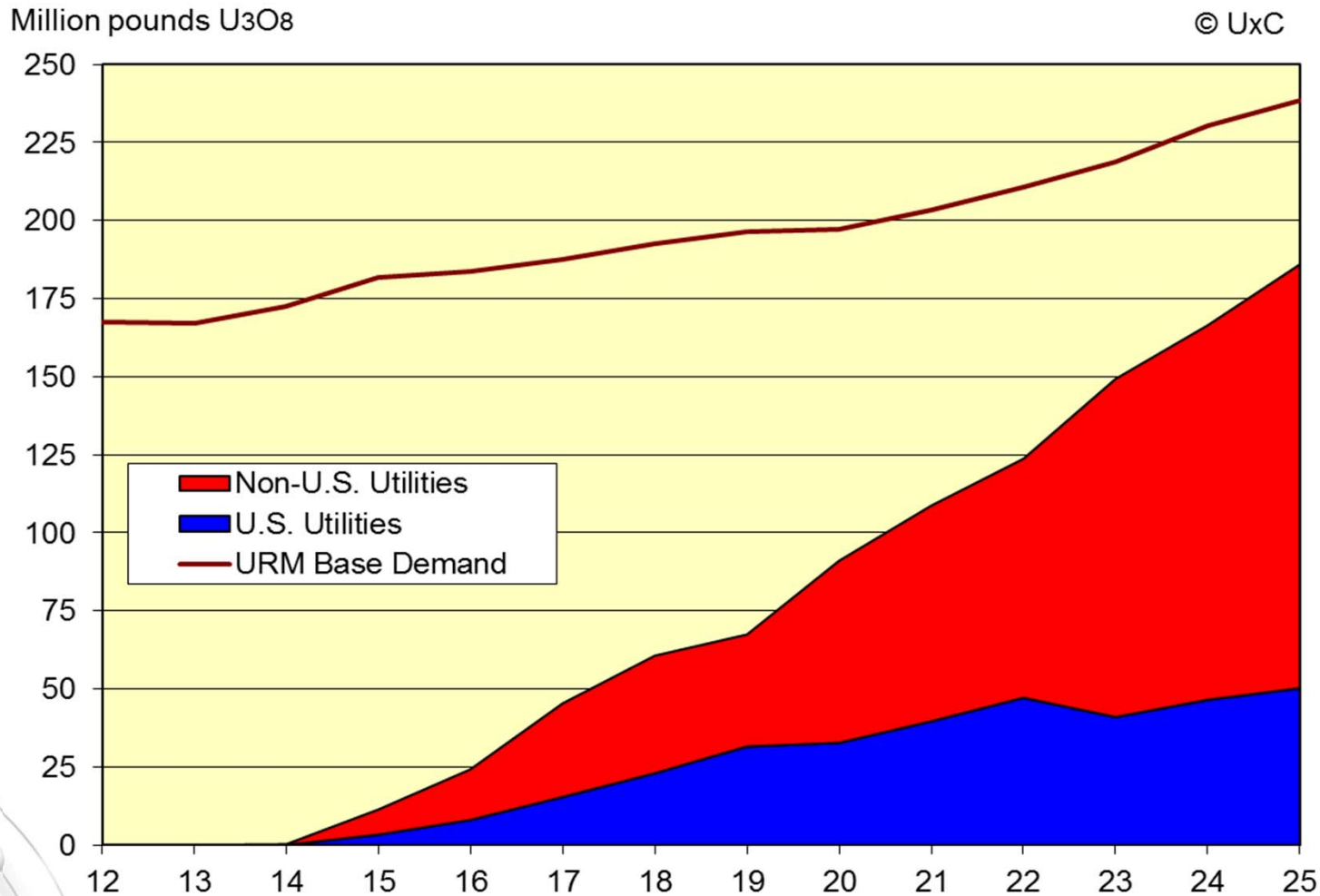
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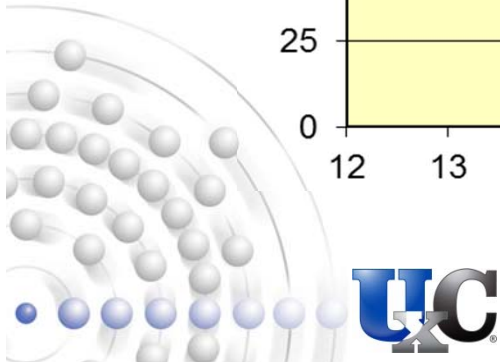
Source: Uranium Market Outlook, Q2 2014



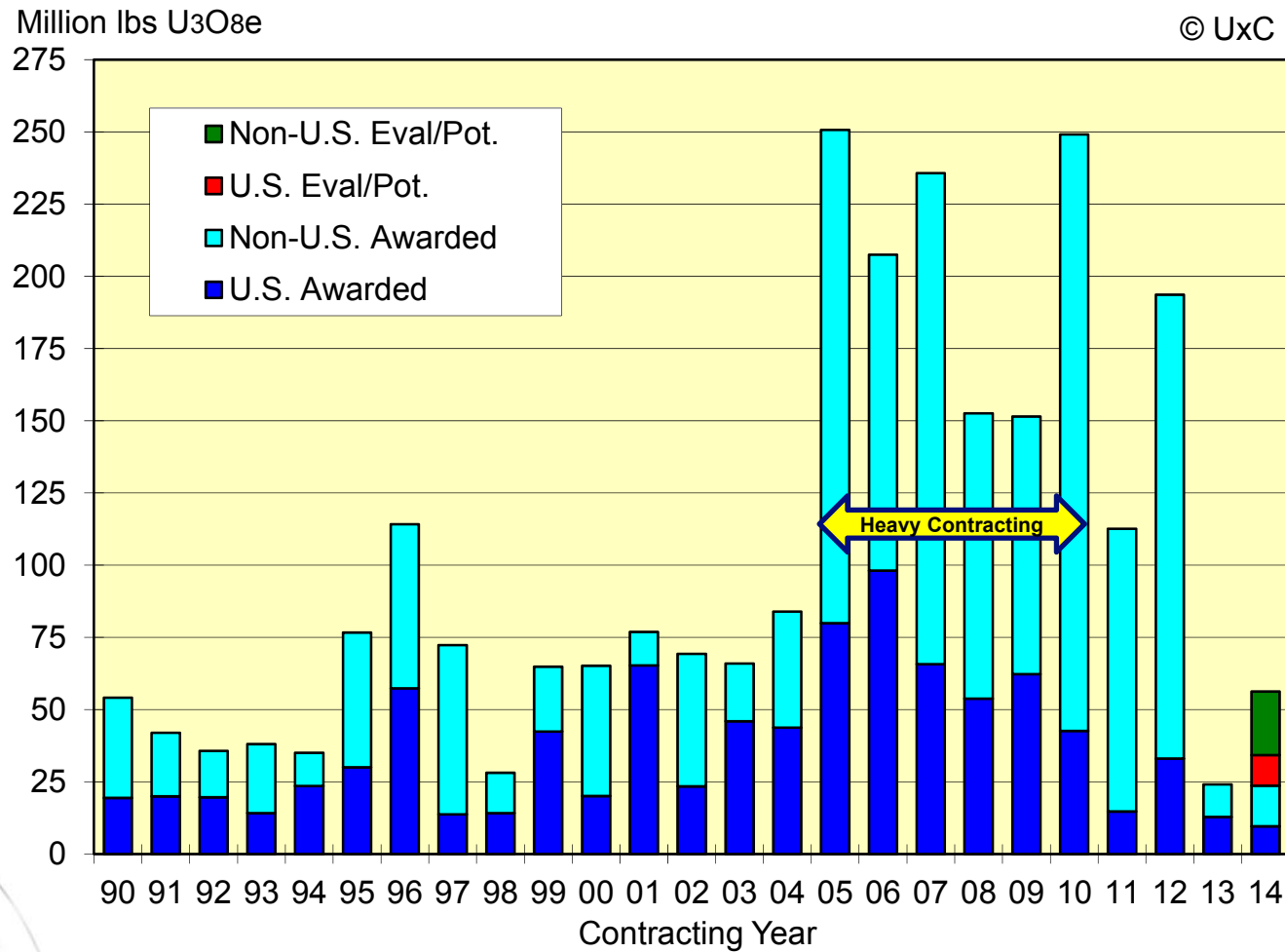
Uncovered Utility Requirements



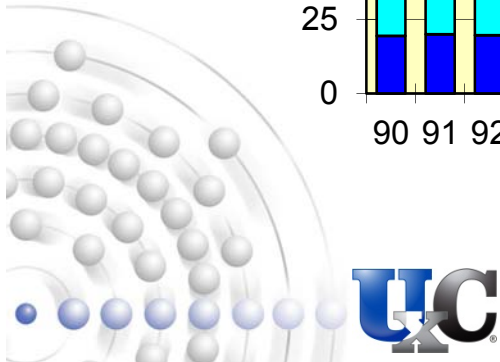
Source: *Uranium Market Outlook*, Q2 2014



Utility LT U₃O₈ Contract Volume 1990-2014



Source: Uranium Market Outlook, Q2 2014



Utility Inventories



▶ U.S. Utilities

- In 2003, ahead of the last price run-up, U.S. utilities held 46 million pounds U_3O_8e
 - Inventories could fuel U.S. reactors, on average, for 9 months
- At the end of 2013, U.S. utilities held more than double that amount at 112 million pounds U_3O_8e
 - Inventories could fuel U.S. reactors, on average, for 29 months (~2.5 years)

▶ European Utilities

- In 2005, EU utilities held 101 million pounds U_3O_8e
 - Inventories could fuel EU reactors, on average, for 22 months
- At the end of 2012, EU utilities held 136 million pounds U_3O_8e
 - Inventories could fuel EU reactors, on average, for almost 3 years

▶ Japanese Utilities

- Post-Fukushima, Japanese utilities have up to 60 million pounds U_3O_8e in various forms
 - Inventories could fuel Japanese reactors, on average, between 4 to 5 years



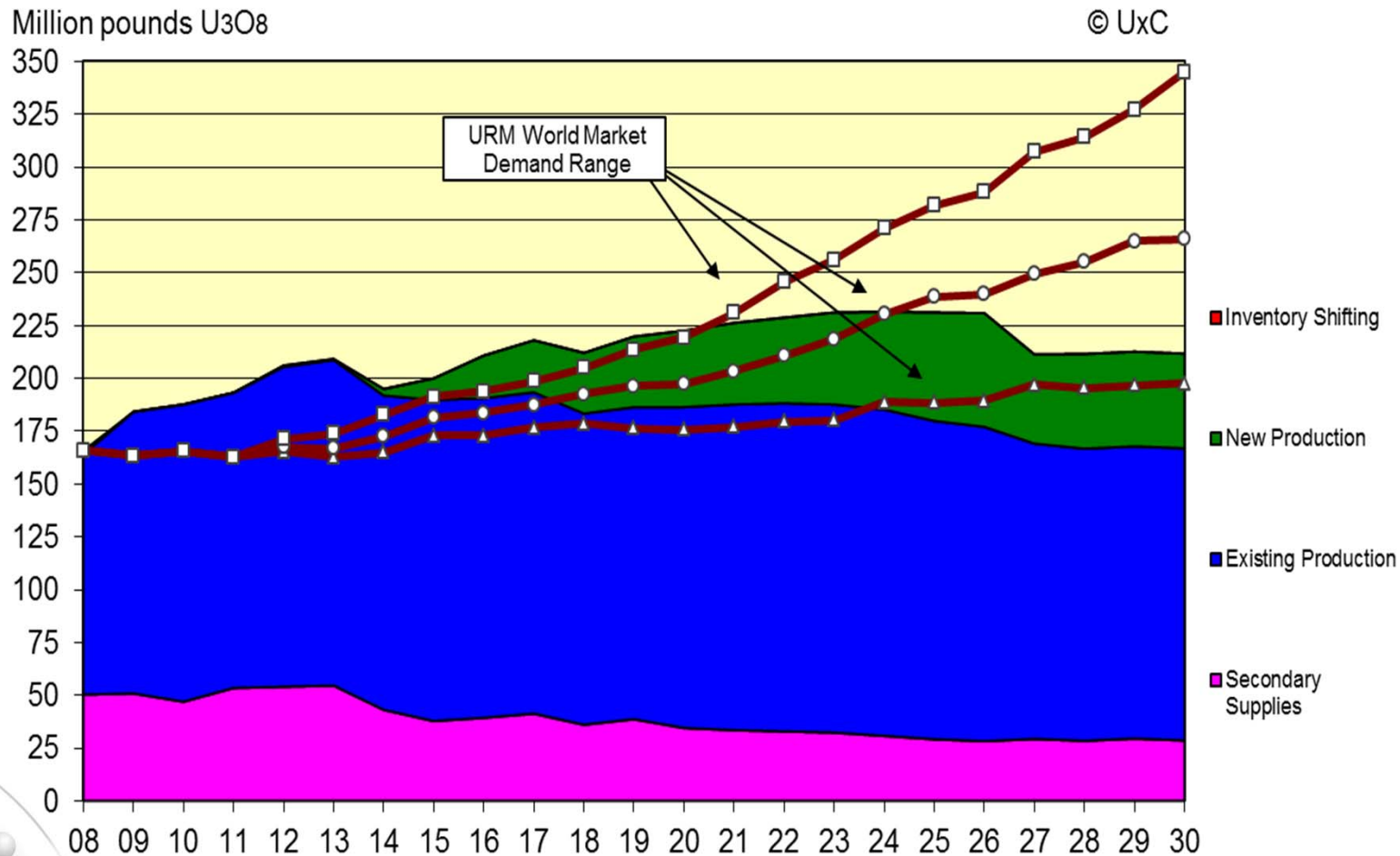
Secondary Supplies



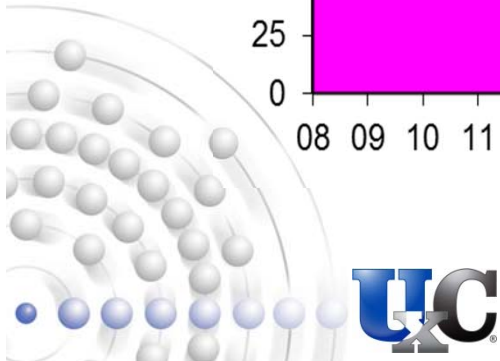
- ▶ **Despite end of U.S.-Russia HEU deal, secondary supplies are having a major impact on uranium prices**
- ▶ **Secondary supplies will continue to be a low cost supply source and meet 18-25% of total demand through 2020**
 - Can assume a \$0 cost for the sake of market analysis
- ▶ **Enricher underfeeding has been an important part of secondary supply since the Fukushima accident**
 - URENCO underfeeding estimated at 4-5 million pounds per annum
 - Russian underfeeding/tails re-enrichment estimated at ~10+ million pounds per annum
- ▶ **Recent U.S. DOE Secretarial Determination allows for the supply of up to 7-8 million pounds annually through 2022**
- ▶ **Commercial inventory drawdown/sales approximate 3-5 million pounds per annum**
- ▶ **Mox and Reprocessed U accounts for 7-10 million pounds annually going forward**



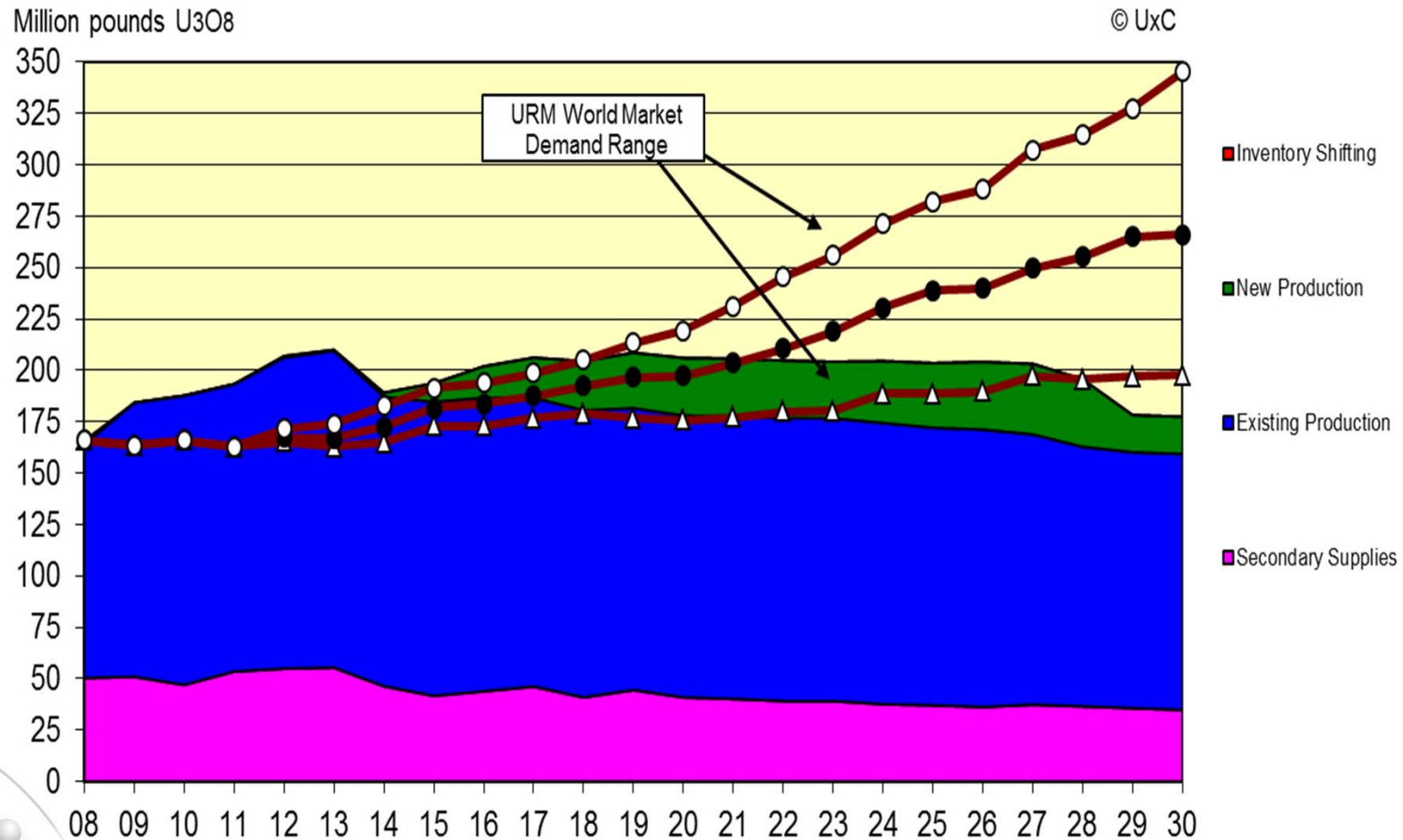
Major World Supply Sources 2008-2030 – Mid Production Case



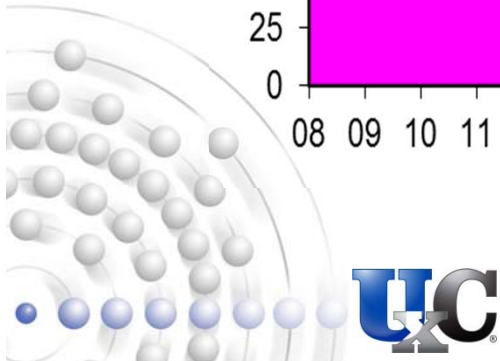
Source: *Uranium Market Outlook*, Q2 2014



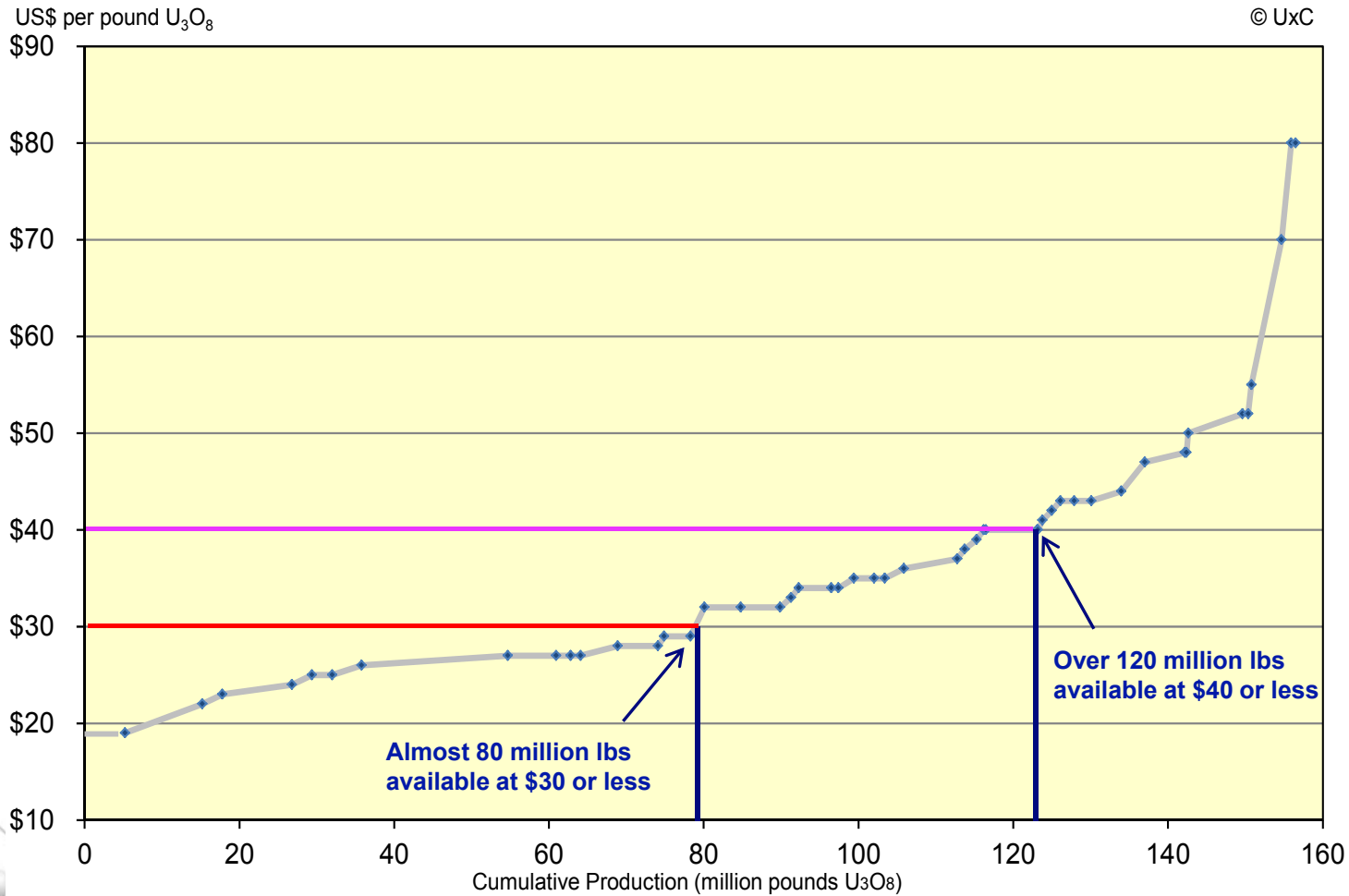
Major World Supply Sources 2008-2030 – Low Production Case



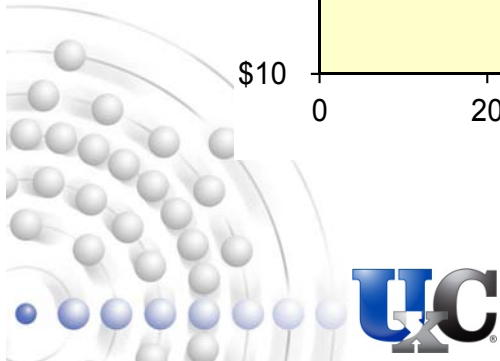
Source: Uranium Market Outlook, Q2 2014



2013 Production Cost Curve



Source: *Uranium Production Cost Study*, August 2013

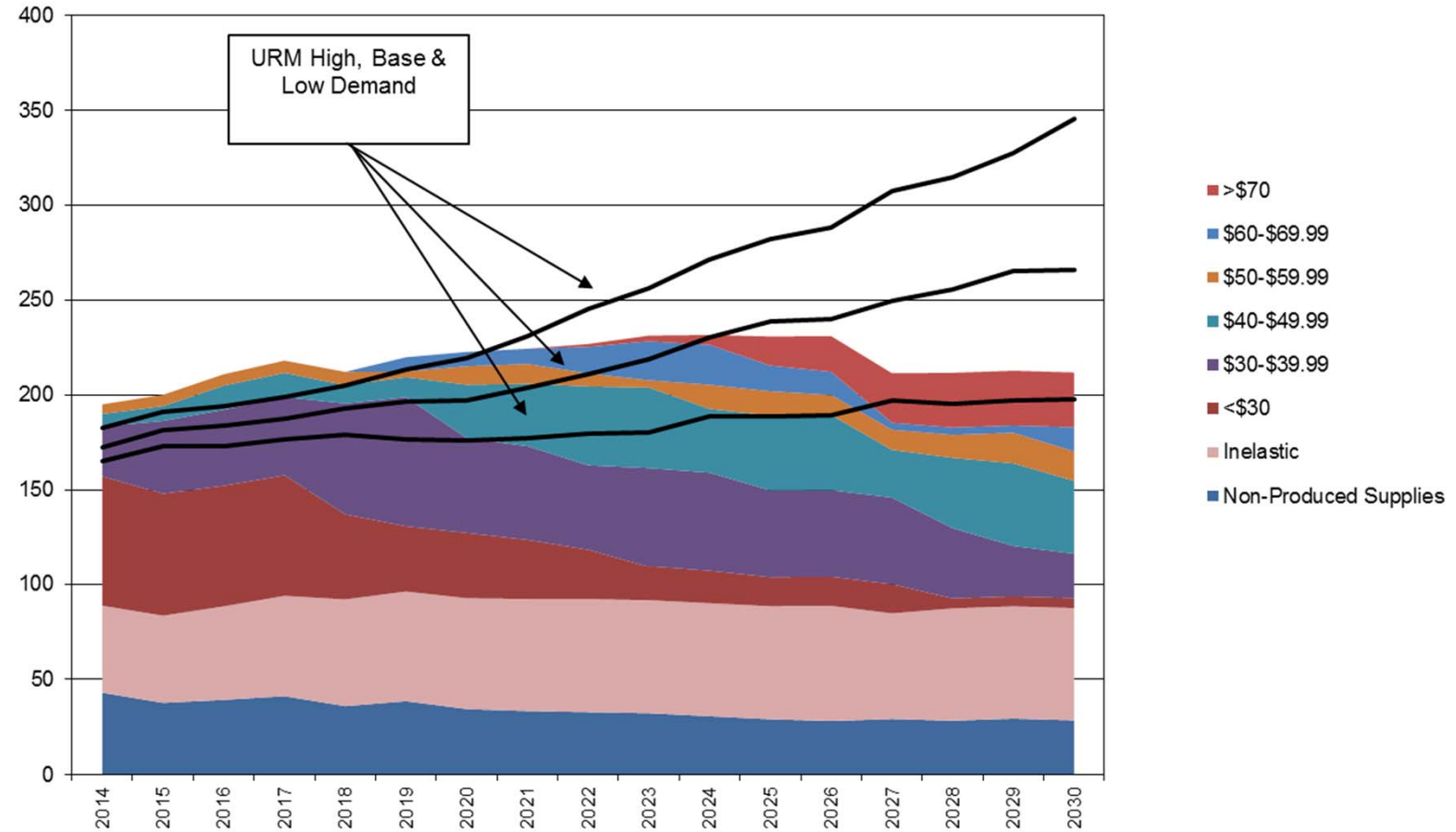


Mid Production Case By Costs, 2014-2030

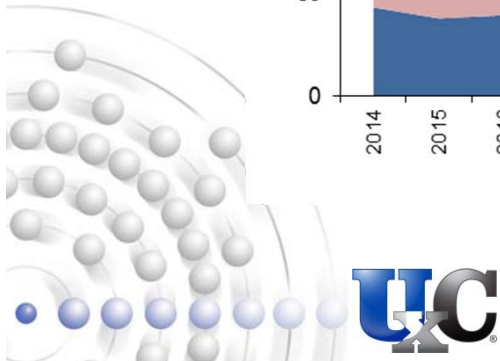


Million pounds U₃O₈

© UxC



Sources: *Uranium Production Cost Study, UMO Q2 2014*



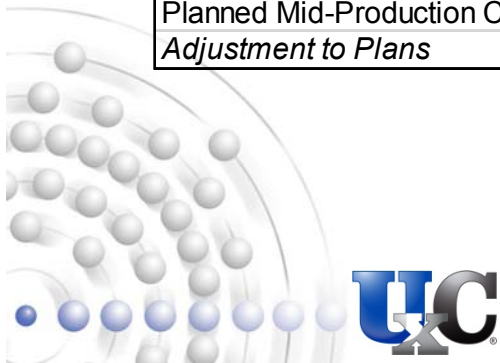
Transitioning Toward Equilibrium



► Near and Medium-Term Outlook

- Significant inventory overhang over 2015-2017 will require existing production be no greater than ~145 million pounds (10 million pounds less than in 2013)
- Secondary supplies will meet up to one-quarter of uranium demand over the next several years despite end of HEU deal
- Marginal production costs do not push higher until start of the next decade
 - Failure to defer/delay production will prolong current price downtrend

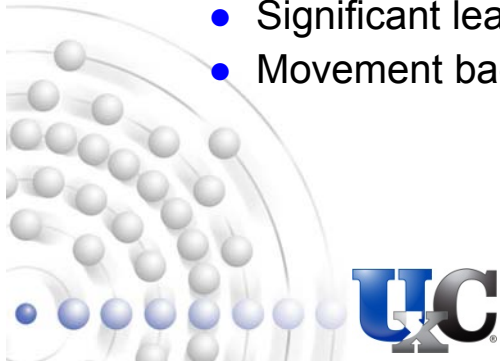
	(Million lbs U ₃ O ₈)																
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Real Demand For Production	129	144	144	146	156	158	163	170	178	186	200	209	212	220	227	235	237
Planned Mid-Production Case	152	162	171	177	176	181	188	191	194	199	201	202	203	182	183	183	183
<i>Adjustment to Plans</i>	-22	-19	-27	-30	-20	-23	-25	-21	-16	-12	-1	8	9	38	44	52	54



Long-Term Outlook



- ▶ **Demand growth improves in 2015-2020, but no need for new production until 2020 or later**
 - Largely driven by China, India, Russia, South Korea, and U.A.E.
- ▶ **Fukushima negativity should decline**
 - Japan has few alternative energy options to nuclear
 - Restarts would also mitigate underfeeding from excess SWU capacity
- ▶ **Nuclear power expected to play a larger role in reducing global CO₂ emissions**
 - China could move existing target of 133 GWe of nuclear capacity by 2030 to 150-200 GWe to achieve meeting greenhouse emissions target.
 - U.S. EPA Carbon Limits
- ▶ **Increased price volatility in the post-2020 period when more uranium production will be needed to replace depleted resources and meet increasing demand**
 - Significant lead times to bring online new production centers
 - Movement back to a production-driven market



A landscape photograph showing rolling hills under a clear blue sky with a few wispy clouds. The scene is reflected in a calm body of water in the foreground, creating a symmetrical effect. The text 'Thank You!' is overlaid in white on the upper portion of the image.

Thank You!

Questions?