



Uranium Market Outlook



– NOTICE –

UxC, LLC (“UxC”) shall have title to, ownership of, and all proprietary rights in this Report. Under United States federal copyright law (17 USC 101 et seq.) it is illegal to reproduce this Report by any means without written permission from UxC.

The information contained in this Report is obtained from sources that UxC believes to be reliable. UxC makes no warranty or representation, express or implied, with respect to the accuracy, completeness or usefulness of the information contained in this Report and UxC, to the maximum extent permitted by law, assumes no liability for the use or effects of any of the information or data contained in this Report.

It is UxC’s strict policy not to endorse, promote, or recommend any particular securities, currencies, or other financial products or instruments. Nothing contained in this Report is intended to constitute investment, legal, tax, accounting or other professional advice and the reader should not rely on the information provided in this Report for making financial decisions.

The Ux U₃O₈ Price[®] and other Ux Price indicators are developed by UxC and are proprietary and exclusive intellectual property of UxC. These price indicators are provided to UxC’s customers through the Ux Weekly[®] publication and are made available on UxC’s public website solely at UxC’s discretion. They may not be reproduced or otherwise used without UxC’s express permission.

UxC[®], Ux Weekly[®], Ux U₃O₈ Price[®], UxC BAP[®], U-PRICE[®], and SWU-PRICE[®] are trademarks of UxC, LLC.

Table of Contents

Executive Summary	i
<i>Market Trends and Latest Developments</i>	i
<i>Essay: Review of 2023 World Uranium Production</i>	i
<i>Price and Contracting Review</i>	ii
<i>Supply and Demand Overview</i>	ii
<i>Price Indicator Technical Analysis</i>	iii
<i>Market Outlook and Price Forecast</i>	iv
Introduction	7
Conventions Used in the Report	7
1 – Essay: Review of 2023 World Uranium Production	8
Production by Country (Ranked)	10
• Kazakhstan	10
Inkai (JV Inkai LLP)	10
Budenovskoye 2 (Karatau LLP)	10
Muyunkum/Tortkuduk (KATCO LLP)	11
South Inkai (JV SMCC LLP)	11
North Kharasan 1 (Kyzylkum LLP)	11
Budenovskoye 1, 3, and 4 (JV Akbastau JSC)	11
Central Mynkuduk (JV Ortalyk LLP)	11
E. Mynkuduk, Kanzhugan, and C. Moinkum (Kazatomprom-SaUran LLP)	12
North Kharasan 2 (Baiken-U LLP)	12
North and Southern Karamurun (RU-6 LLP)	12
Western Mynkuduk (APPAK LLP)	12
Akdala (JV SMCC LLP)	12
Zarechnoye (JV Zarechnoye JSC)	12
Irkol (Semizbai-U LLP)	13
Semizbai (Semizbai-U LLP)	13
Budenovskoye 6/7 (Budenovskoye LLP)	13
Zhalpak (JV Ortalyk LLP)	13
• Canada	14
Cigar Lake	14
McArthur River	14
• Namibia	14
Husab	14
Rössing	15
• Australia	15
Olympic Dam	15
Four Mile	15
• Uzbekistan	15
Navoi	16
• Russia	16
Priargunsky	16
Khiagda	16
Dalur	16
• China	17
• Niger	17
SOMAÏR (Arlit)	17
• Other	17
Production in the Queue	18
• Australia	18
• Canada	18
• Finland	19
• Niger	19
• U.S.	19
Meeting Mid-Term Demand	20
2 – Uranium Contracting and Price Review	21
Spot Market Contracting Review	21

• 2024 Spot Contracting Activity	21
Long-Term Contracting Review.....	27
• 2024 Term Contracting Activity	27
U ₃ O ₈ Price Review	31
• Spot Ux U ₃ O ₈ Price	31
• Trends in Long-Term Contract Pricing	32
Ux LT U ₃ O ₈ Price Movements	32
Escalation Factors.....	32
Escalated LTC Prices Compared to the Spot Price Outlook	33
Buy/Hold Alternative.....	33
3 – Requirements and Demand Outlook	34
Key Reactor Developments by Region	35
Regional Highlights	36
• North America	36
• Western Europe	37
• Central & Eastern Europe	37
• Asia & Oceania	38
• Africa & Middle East.....	39
• South America.....	39
Reactor Capacities Anticipated by 2040 by Country	40
Quarterly Changes to Base Case Nuclear Power Forecast	42
Alternative UxC Reactor Forecasts	43
Demand Forecasts	44
• Reactor Requirements vs. Market Demand	44
• UxC Uranium Market Demand	44
UxC Requirements Model (URM).....	44
Demand Updates	45
• Reviewing Uncovered Utility Requirements	47
Spot and Term Demand Outlook.....	50
• Spot Demand in 2024-2025	50
Near-Term Spot Demand Estimates	52
• Long-Term Demand Over Next 12 Months	53
4 – Production and Supply Outlook	55
Production Forecast	55
• UxC Production Forecast Comparisons.....	55
Key Assumptions in the Base Case Production	55
Key Assumptions in the High Case Production	57
Key Assumptions in the Low Case Production.....	59
• Key Production Changes since the Last Report	60
• Existing Production	61
Africa.....	61
Australia	62
Canada	62
China.....	64
India	64
Kazakhstan	64
Russia	66
U.S.	66
Ukraine.....	69
Uzbekistan	69
• Planned Production.....	70
Africa.....	70
Australia	74
Canada	74
U.S.	75
Uzbekistan	77
Europe	78
Secondary Supplies	79
• Government Inventories.....	79
Latest Developments	79
• Enricher Sales.....	80

Latest Developments.....	81
• Commercial Inventories	81
Utility Inventory Holdings	81
Supplier Inventory Holdings.....	82
Financial Inventory Holdings.....	83
• Recycled Uranium.....	83
Latest Developments.....	84
• Fuel Banks.....	84
• Analysis.....	85
Policy Issues Affecting the Market	86
• H.R. 1042 –Prohibiting Russian Uranium Imports Act – Becomes Law	86
• TENEX Issues Notices of a Force Majeure Event	86
• U.S. DOE Issues Instructions for Requesting a Waiver.....	87
• U.S. DOE Issues LEU Off-Take Pre-Solicitation Announcement	87
• H.R. 8046 – Rosatom Sanctions Enforcement Act.....	88
• Russian Suspension Agreement (RSA).....	88
• Niger Update.....	89
• Transportation of Uranium from Kazakhstan	90
5 – Near-Term Technical Analysis & Spot Market Indicators	91
Near-Term Technical Analysis	91
Near-Term Spot Price Indicators.....	93
Long-Term Spot Price Indicators	94
6 – Market Outlook and Price Forecasts	97
Near-Term Market Outlook	97
• Spot Price Outlook – 3 Months	97
• Spot Price Outlook – 12 Months	98
• Long-Term Contract Market.....	98
Recent Developments	98
Outlook	99
Longer Term Market Outlook (2025-2040).....	100
• Supply/Demand Balance	100
• Interest & Exchange Rates	102
• Longer Term Trends	103
UxC Spot U ₃ O ₈ Price Forecasts.....	105
• Uranium Price Formation: Key Factors.....	107
• Mid Price Scenario.....	109
• High Price Scenario	111
• Low Price Scenario	113
• Composite Spot Price Scenario	115
UxC Long-Term U ₃ O ₈ Price Forecasts.....	118
• Mid LT Base Price Scenario	119
• Composite LT Base Price: Probability Analysis.....	120
Appendix A – Indicator System Methodologies	122
Spot Price Indicator System Methodology	122
• Near-Term Indicator Methodology	122
• Long-Term Indicator Methodology	124
Appendix B – UxC U₃O₈ Price Supplement	126
Ux U ₃ O ₈ Price Indicators	126
UxC Broker Average Price (BAP)	129
• UxC Participating Brokers.....	129
Fund Implied Price (FIP)	130
CME/COMEX UxC Uranium U ₃ O ₈ (UX) Futures Activity	131
UxC-Numerco Forward Price Curve	133
Appendix C – Statistical Review	134
Historical Review.....	134
Industry Data.....	136
Future Outlook and Forecasts.....	138

List of Figures

Figure E-1. Ux U ₃ O ₈ Prices	ii
Figure E-2. Monthly Spot Volume vs. Price	ii
Figure E-3. Utility LTC Volume.....	ii
Figure E-4. Uncovered Requirements.....	iii
Figure E-5. Base Case Uranium Supply/Demand Balance.....	iii
Figure E-6. Long-Term Spot Market Indicators vs. Spot Price.....	iv
Figure E-7. UxC Price Forecast Comparison	iv
Figure 1. Uranium Production: Historical & Planned.....	8
Figure 2. 2023 Production Shares by Country	9
Figure 3. Monthly Spot Uranium Volume by Form	21
Figure 4. Annual Spot Uranium Volumes by Form, 1990-2024	22
Figure 5. Ux U ₃ O ₈ Price vs. Volume by Delivery Month.....	22
Figure 6. Spot Volume by Need vs. Weekly Price, 1999-2024	23
Figure 7. Spot Volume by Method vs. Weekly Price, 1999-2024.....	23
Figure 8. Investor Spot Purchases.....	24
Figure 9. Quarterly Spot Volume by Buyer, 1996-2024	24
Figure 10. Quarterly Spot Volume by Seller, 1996-2024	25
Figure 11. Seasonal Trends vs. 2024 Activity Levels	25
Figure 12. Monthly Spot Volume vs. Price, 2004-2024.....	26
Figure 13. Long-Term Uranium Contracting Activity, 1990-2024.....	27
Figure 14. 2023 LTC Deliveries by Utility Buying Group & Form	28
Figure 15. Long-Term Contracting Volume by Method, 1998-2024	28
Figure 16. Annual Volatility in Ux U ₃ O ₈ Price	31
Figure 17. Recent Spot Ux U ₃ O ₈ Prices.....	31
Figure 18. Recent Ux U ₃ O ₈ Prices	32
Figure 19. Buy/Hold Alternative Pricing Evaluation.....	33
Figure 20. Map of UxC Nuclear Regions	35
Figure 21. UxC Nuclear Generating Capacity Forecast, 2008-2040.....	40
Figure 22. UxC Base, High, and Low Case Nuclear Capacity Forecasts, 2008-2040	43
Figure 23. Comparison of URM Uranium Market Demand Cases, 2008-2040.....	45
Figure 24. URM Base Case Demand with & without Inventory & Secondary Demand, 2008-2040	45
Figure 25. Comparison of Uncovered Utility Uranium Requirements, 2005-2040	47
Figure 26. Uncovered Utility Uranium Requirements, 2024-2040.....	48
Figure 27. Annual Spot Volumes	50
Figure 28. 2005-2024 Actual and Expected Spot U ₃ O ₈ Volume	52
Figure 29. Utility LTC Volume Over the 1990-2024 Period.....	53
Figure 30. 2024 Utility LTC Activity.....	54
Figure 31. Market Demand vs. Base Case Supply Sources, 2008-2040.....	55
Figure 32. Market Demand vs. High Case Supply Sources, 2008-2040.....	57
Figure 33. Market Demand vs. Low Case Supply Sources, 2008-2040	58
Figure 34. U.S. Utility Inventories, 1983-2022	82
Figure 35. Base Case Secondary Supplies Disposition, 2018-2040.....	85
Figure 36. Ux Weekly Spot Price, 1987-2024.....	91
Figure 37. Ux Price vs. 30-Week Moving Average	92
Figure 38. Net Changes in the Uranium Spot Price by Month, 1969-2024.....	92
Figure 39. Near-Term Net Indicator Values vs. Price, 1995-2024	93
Figure 40. Long-Term Net Indicator Values vs. Price, 1989-2024	95
Figure 41. Market Demand vs. Base Case Supply, 2008-2040.....	101
Figure 42. Mid Projection, Current vs. Constant \$	110
Figure 43. UxC Mid Spot Price Scenario Projection and Annual Variance, 2000-2040.....	110
Figure 44. High Projection, Current vs. Constant \$.....	112
Figure 45. UxC High Spot Price Scenario Projection and Annual Variance, 2000-2040	112
Figure 46. Low Projection, Current vs. Constant \$	114
Figure 47. UxC Low Spot Price Scenario Projection and Annual Variance, 2000-2040	114
Figure 48. UxC Price Forecast Comparison	115
Figure 49. Composite, Current vs. Constant \$.....	115
Figure 50. UxC Composite Scenario U ₃ O ₈ Price Projection Comparison, 2000-2040.....	116
Figure 51. UxC Spot U ₃ O ₈ Price Projection Comparison, 2000-2040.....	117

Figure 52. UxC U ₃ O ₈ LT Composite Projection, Current vs. Constant \$, 2004-2040	120
Figure 53. UxC U ₃ O ₈ Long-Term Base Price Projection Comparison, 2004-2040	121
Figure A-1. Near-Term Uranium Net Indicator Value vs. Ux U ₃ O ₈ Price, 1990-2024	122
Figure A-2. Long-Term Uranium Net Indicator Value vs. Spot Price, 1989-2024	124
Figure B-1. Ux U ₃ O ₈ Prices – Spot, 1987-2024	128
Figure B-2. Ux U ₃ O ₈ Prices, 2004-2024.....	128
Figure B-3. UxC Broker Average Price vs. Ux U ₃ O ₈ Price, 2009-2024.....	129
Figure B-4. Ux U ₃ O ₈ Price vs. Fund Implied Price (FIP), 2022-2024.....	130
Figure B-5. Ux U ₃ O ₈ Price vs. Fund Implied Price (FIP), 2006-2024.....	130
Figure B-6. Ux U ₃ O ₈ Prices vs. CME & NL Forward Price Curves	132
Figure B-7. CME/COMEX UX Futures Activity – Total Contracts by Transaction Month, Year.....	132
Figure B-8. CME/COMEX UX Futures Activity – Total Contracts by Settlement Month.....	132
Figure B-9. UxC-NL U ₃ O ₈ Forward Price Curve, 2012-2039	133
Figure C-1. Monthly Spot U ₃ O ₈ Volume by Form vs. Price, 1999-2024.....	134
Figure C-2. Utility Long-Term Uranium Contracting Volumes, 1990-2024	135
Figure C-3. ESA Fuel Loaded vs. Deliveries Made	137
Figure C-4. Euratom Average Spot & Long-Term Uranium Prices vs. Deliveries to EU Utilities.....	137
Figure C-5. Comparison of Previous Year's EU Uranium Requirements	137
Figure C-6. URM Uranium Market Demand Comparison, 2008-2040	138
Figure C-7. URM Base Case Demand with & without Inventory Build, 2008-2040	138
Figure C-8. UxC Uncovered Utility Requirements, 2024-2040	139
Figure C-9. Comparison of EIA U.S. Utility Unfilled Requirements, 2001-2032	140
Figure C-10. Base Case Secondary Supplies Disposition, 2018-2040.....	142
Figure C-11. World Base Case Uranium Production by Country, 1998-2040.....	143
Figure C-12. World Uranium Market Demand vs. Base Case Supply Sources, 2008-2040.....	143
Figure C-13. UxC Composite and Mid U ₃ O ₈ Spot Price Projections, Current vs. Constant \$.....	144
Figure C-14. UxC High and Low U ₃ O ₈ Spot Price Projections, Current vs. Constant \$.....	144
Figure C-15. UxC U ₃ O ₈ Spot Price Projection Comparison, 2000-2040	145
Figure C-16. UxC U ₃ O ₈ Long-Term Base Price Projection Comparison, 2004-2040	145

List of Tables

Table 1. World Uranium Production by Mining Method, 2000-2023	9
Table 2. 2023 Kazakh Mine Production (million lbs U ₃ O ₈)	10
Table 3. Quarterly Spot Market Statistics, 2023-2024	26
Table 4. Utility Long-Term Contracts Summary, 2024	27
Table 5. 2024 Utility Awarded Long-Term Uranium Contracting Activity	29
Table 6. Trends in LT Contract Terms & Conditions	30
Table 7. Escalator Review, 1990-2023	32
Table 8. LTC Price vs. Spot Price Projections, 2024-2033	33
Table 9. List of NPO Countries by Region	35
Table 10. Reactor Units & Nuclear Capacities Anticipated by Country by 2040	40
Table 11. Quarterly Changes to Base Case Forecast by Region/Country	42
Table 12. UxC Base, High, and Low Case Nuclear Reactor and Capacity Forecasts, 2022-2040	43
Table 13. UxC Utility Inventory Build and Secondary Demand Forecasts, 2022-2040	46
Table 14. UxC Uranium Market Demand Forecasts, 2022-2040	46
Table 15. UxC Total Uranium Requirements Volume Estimate, 2024-2040	49
Table 16. UxC Uncovered Uranium Requirements Volume Estimate, 2024-2040	49
Table 17. UxC Uncovered Uranium Requirements Percentage Estimate, 2024-2040	49
Table 18. Potential Spot Purchases	50
Table 19. Potential Utility Long-Term Contracting Activity Over Next 12 Months	54
Table 20. Uranium Investment Fund Holdings	83
Table 21. Long-Term Uranium Indicators as of Q2 2024	96
Table 22. 3-Month Spot Price Variance	97
Table 23. 12-Month Spot Price Variance	98
Table 24. Arguments for 2025-2027 Price Movements	104
Table 25. Key Assumptions Used to Develop Spot U ₃ O ₈ Price Scenarios	107
Table 26. Key Factors Used to Develop Mid Price Scenario	109
Table 27. UxC Annual Spot Price Projections – Mid Price Scenario, 2024-2040	110
Table 28. Key Factors Used to Develop High Price Scenario	111
Table 29. UxC Annual Spot Price Projections – High Price Scenario, 2024-2040	112
Table 30. Key Factors Used to Develop Low Price Scenario	113
Table 31. UxC Annual Spot Price Projections – Low Price Scenario, 2024-2040	114
Table 32. Probabilities for Periods of Increasing, Stable, and Declining Spot Prices	115
Table 33. UxC Annual Price Projections – Composite Price, 2024-2040	116
Table 34. UxC Composite Spot Price Weightings, 2024-2040	116
Table 35. Probabilities for Periods of Increasing and Declining Long-Term Base Prices	120
Table 36. UxC Annual Long-Term Base Price Projections, 2024-2040	121
Table 37. UxC Composite Long-Term Base Price Weightings, 2024-2040	121
Table A-1. Historical Near-Term Uranium Spot Market Indicators	123
Table A-2. Historical Long-Term Uranium Spot Market Indicators	125
Table B-1. Ux U ₃ O ₈ Month-End Prices, 1987-2024	126
Table B-2. UxC Participating Brokers	129
Table B-3. CME Monthly Activity, 2019-2024	131
Table B-4. UxC-NL U ₃ O ₈ Forward Price Curve, 2024-2028	133
Table C-1. Spot Market Statistics, 2020-2024	134
Table C-2. Utility Long-Term Uranium Contracts Summary, 2020-2024	135
Table C-3. Natural Uranium Feed Deliveries and Average Contract Prices to EU Member Utilities	136
Table C-4. UxC Uranium Market Demand Forecasts, 2022-2040	138
Table C-5. UxC Uncovered Uranium Requirements Volume Estimate, 2024-2040	139
Table C-6. EIA U.S. Utility Unfilled Uranium Requirements, 2020-2032	140
Table C-7. Existing Mines & Processing Facilities, Base Case, 2022-2040	141
Table C-8. New Mine Development – Planned & Potential, Base Case, 2022-2040	142
Table C-9. Secondary Supplies, Base Case, 2022-2040	142
Table C-10. UxC Annual Spot and Long-Term Price Projections, 2024-2040	146

Introduction

The *Uranium Market Outlook* is organized as follows: **Chapter 1** contains a topical essay that addresses key events and their potential market impact. This quarter's essay, "**Review of 2023 World Uranium Production**," highlights how 2023 global uranium production has measured up against significant increases in demand, which have been driven by multiple factors, including declining inventories, secondary demand from financials, the U.S. ban on Russian LEU imports, and geopolitical tension in Niger.

In **Chapter 2 – Uranium Contracting and Price Review**, recent spot and long-term market activity over the previous quarter is reviewed, and current contract terms and conditions are summarized. **Chapter 3 – Requirements and Demand Outlook** looks at recent developments affecting reactor requirements in the world's regional markets, along with a review of requirements forecasts. An updated view on uncovered utility reactor requirements is also presented. This section also examines the spot demand outlook over the next three years and the long-term contract demand outlook over the next 12 months.

Chapter 4 – Production and Supply Outlook reviews recent production developments worldwide and the status of major world uranium projects. Also examined are inventory sellers and potential spot supply over the next three years. **Chapter 5 – Near-Term Technical Analysis & Spot Market Indicators** presents a technical analysis of near-term price movements and a detailed update of the long-term spot price indicators, designed by UxC to quantify market factors that are affecting price outlook two years forward.

In the final chapter of this report, **Chapter 6 – Market Outlook and Price Forecasts**, the market is analyzed in terms of one-year and intermediate-term perspectives, and forecasts are presented for the spot price and long-term base price through 2040. The near-term availability of supply by price, market trends, and bullish and bearish arguments for price movements are also presented in this chapter.

The report contains three appendices. The first appendix, **Appendix A – Indicator System Methodologies**, details the methodologies used in this report related to market price indicators. The second appendix, **Appendix B – UxC U₃O₈ Price Supplement**, contains data specifically on the various Ux Prices and related indicators. The third appendix, **Appendix C – Statistical Review**, contains tables and figures that provide additional and expanded data to those presented in the body of the report.

Conventions Used in the Report

Unless otherwise stated, quantities are given in millions of pounds U₃O₈ and prices in terms of US\$/lb U₃O₈. Price forecasts are presented in current (year-of-delivery) dollars.