

Global Uranium Supply Risks

Is History Repeating?

(No ... It May Be Worse!)

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2016 World Nuclear Association Symposium

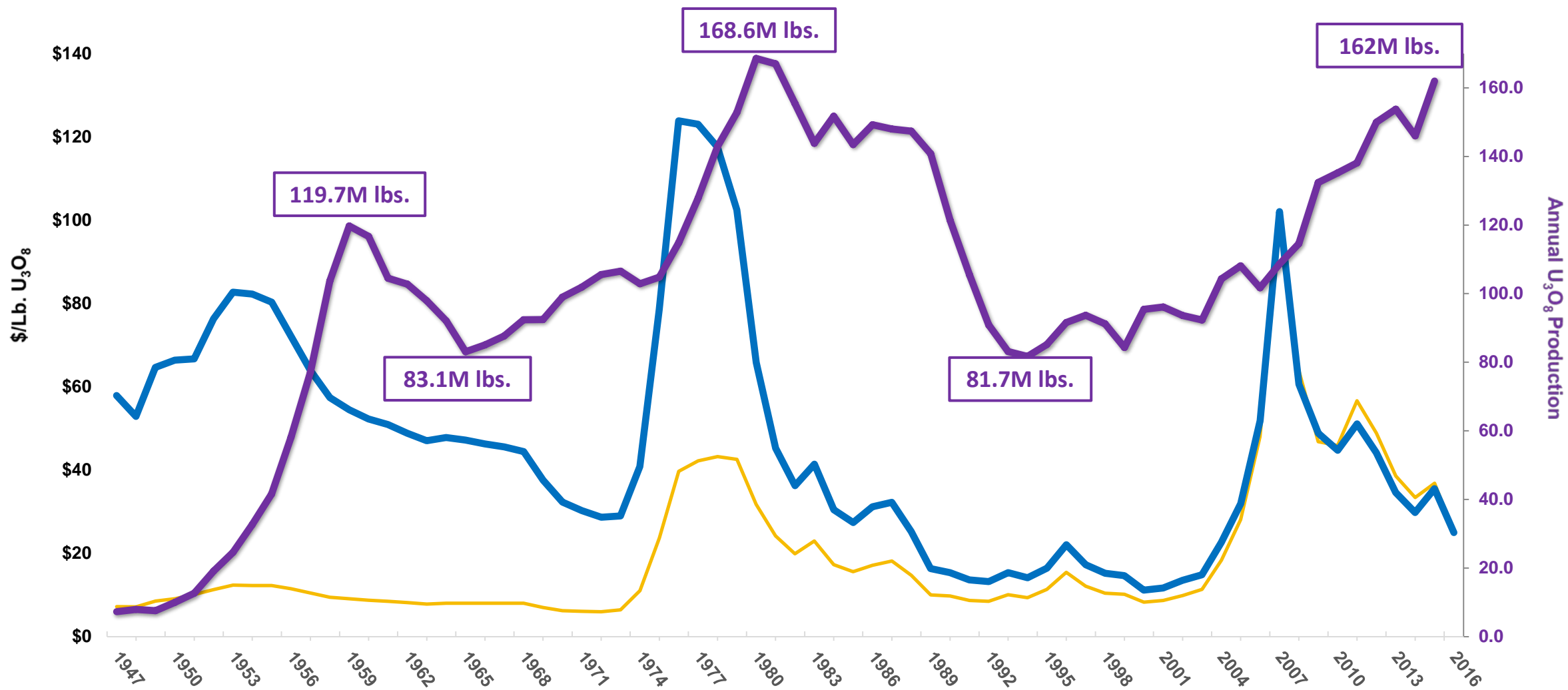
September 15, 2016, London, UK

Recurring Themes in Uranium Production

- ▲ Boom-and-bust tendencies of uranium production and prices
- ▲ Is history relevant in today's market?
- ▲ Are there any historical analogies which can be applied to today's uranium market?
- ▲ Note: Past uranium prices will be normalized using the US Producer Price indices going back into the late 1940's
- ▲ Let's get going.....

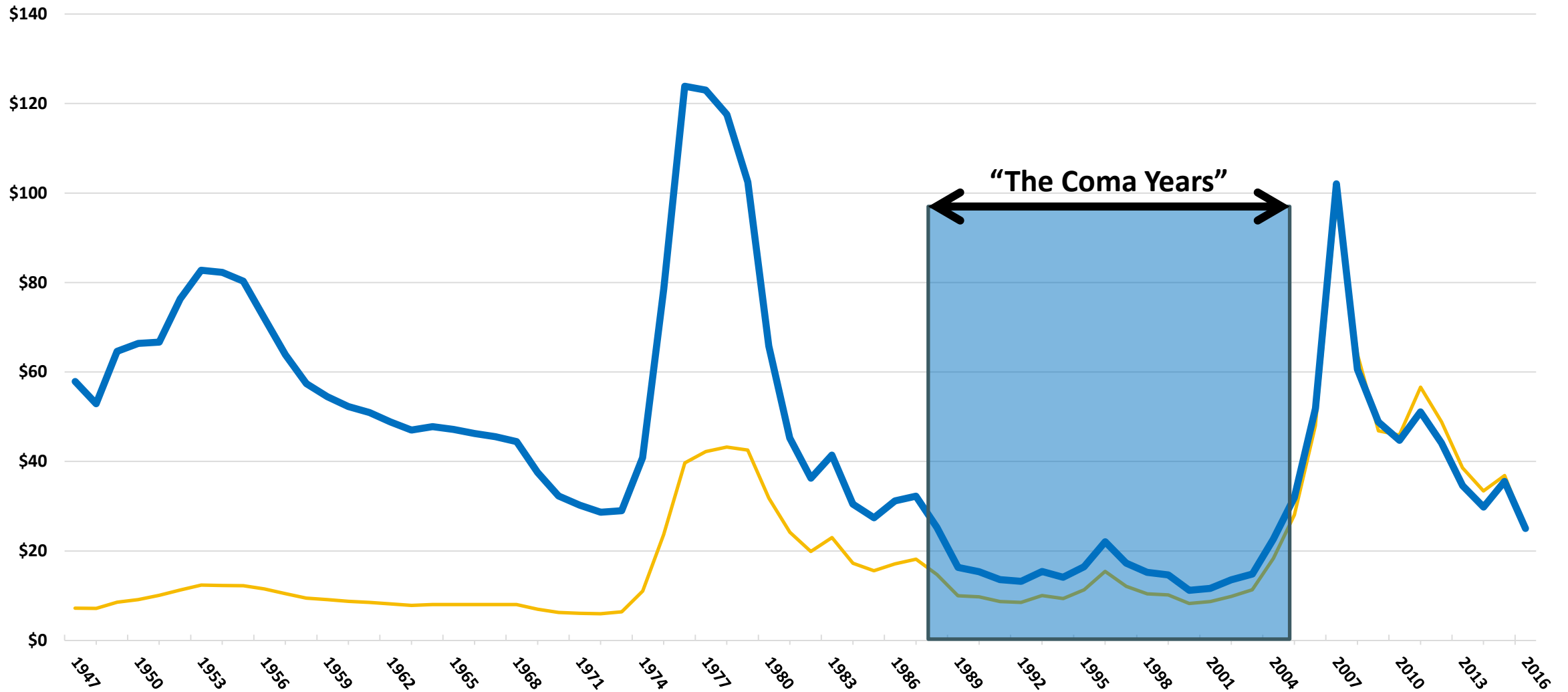
The History of Uranium

Actual vs. Constant US\$



Period 1 – “The Coma Years”

1988 – 2004: A long 17 Years Below US\$30/Lb.



Period 1 – “The Coma Years”

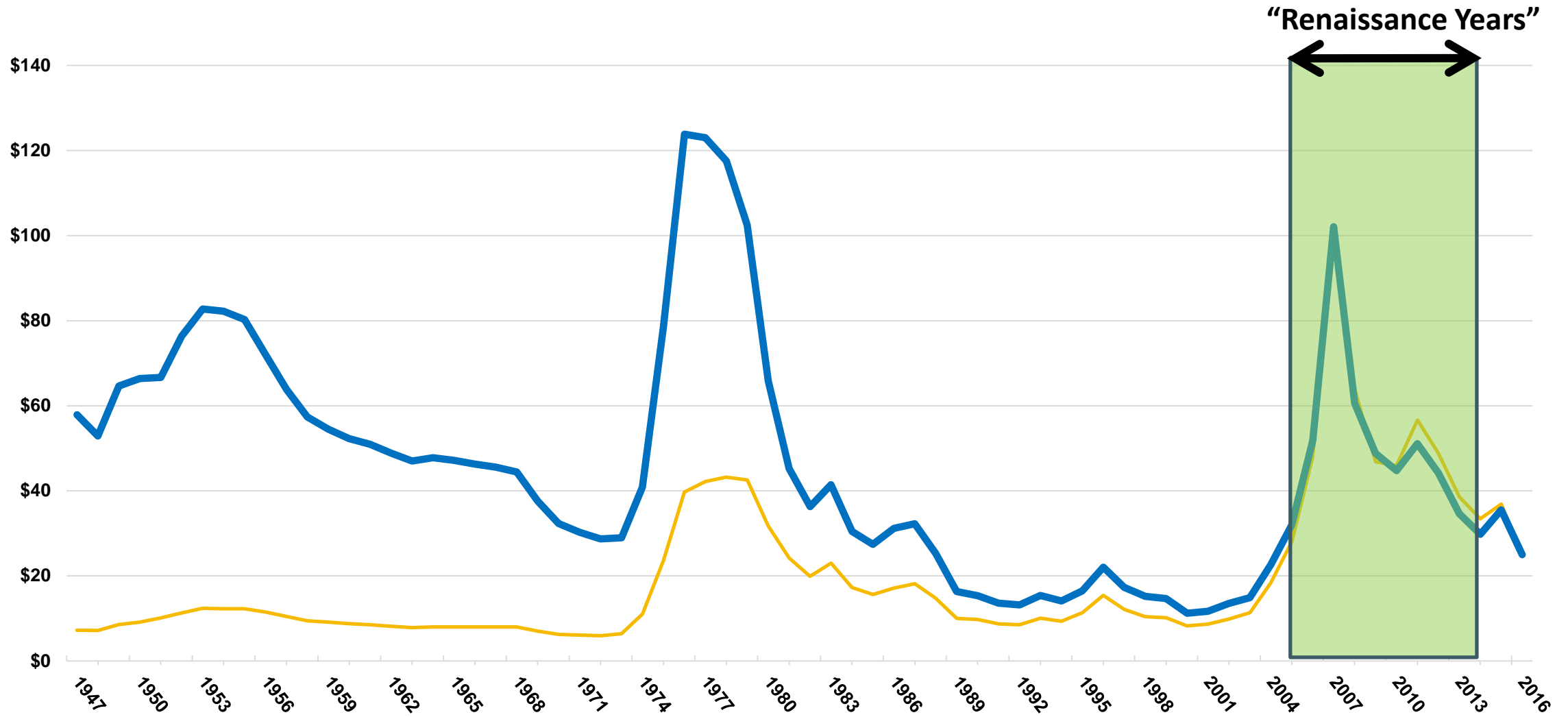
Characteristics



- ▲ Production plummets from peak of 168M lbs. in 1980 to 80 – 90M lbs./yr. in mid-1990's
- ▲ Reactor growth & uranium demand **stagnant**
- ▲ Extremely high global inventories (peak of 2.5 billion lbs. in 1990)
- ▲ Little interest in new or existing projects & limited investment
- ▲ Substantial uranium mining & processing skills lost
- ▲ Many uranium projects deteriorate or are closed forever
- ▲ Surviving companies “high grade” mines to stay alive
- ▲ Many companies, including Cameco, Areva, Energy Fuels & Western Mining, attempt to shift into gold or other commodities to survive
- ▲ Big oil & gas companies permanently exit the industry – and their capital goes with them

Period 2 – “The Renaissance Years”

2004 – 2013: A Short 9 Years Above US\$30/Lb.



Period 2 – “The Renaissance Years”

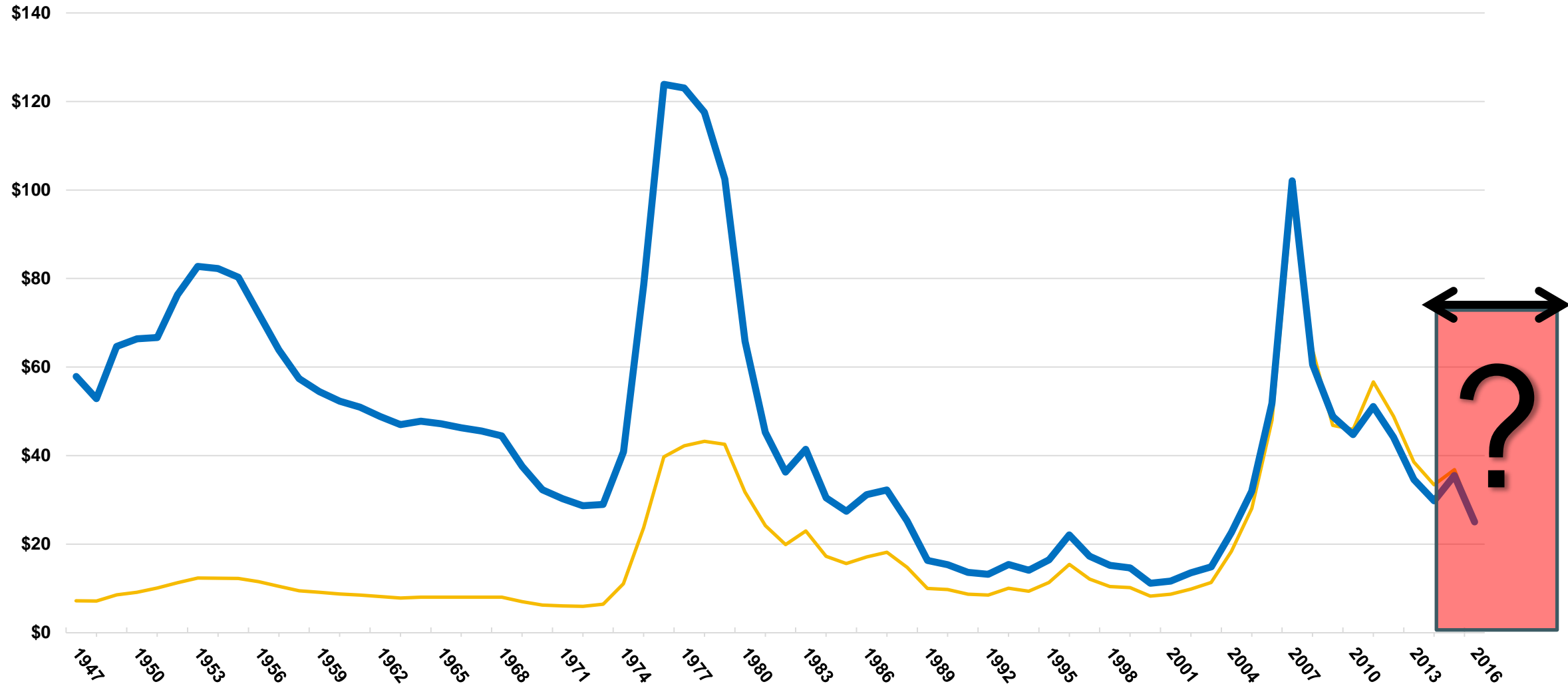
Characteristics



- ▲ Uranium demand expected to **skyrocket**
- ▲ Substantial equity financing available to mining companies
- ▲ Significant lag of **5 – 10+ years** emerges for large, new projects
- ▲ Several projects fail to meet expectations (Trekopje, Dominion, Honeymoon)
- ▲ Companies like Uranium One, Paladin, and a number of smaller juniors spring to life
- ▲ Despite U prices above US\$50/lb., (ex-Kazakhstan) global uranium production drops 12M lbs./year!
- ▲ **2009 WNA Report:**
 - Annual Near-Term Production: 70M lbs./yr (45M lbs. in “development” + 25M lbs. “planned” and “prospective”, ex-Kazakhstan)
 - 2014 (Actual): Only **9%** of this new annual production made it into the market
 - 2015 (Actual): Cigar Lake commences production, and this figure “leaps” to **22%**
- ▲ **Kazakhstan is the only reason there have been no uranium shortages ... the only reason!**

Period 3 – 2013 to Today

Another “Coma” or “The Calm Before the Storm”?



Period 3 - ?????

Key Elements of “Coma Period” Repeating ... with **BIG** Differences



Similarities

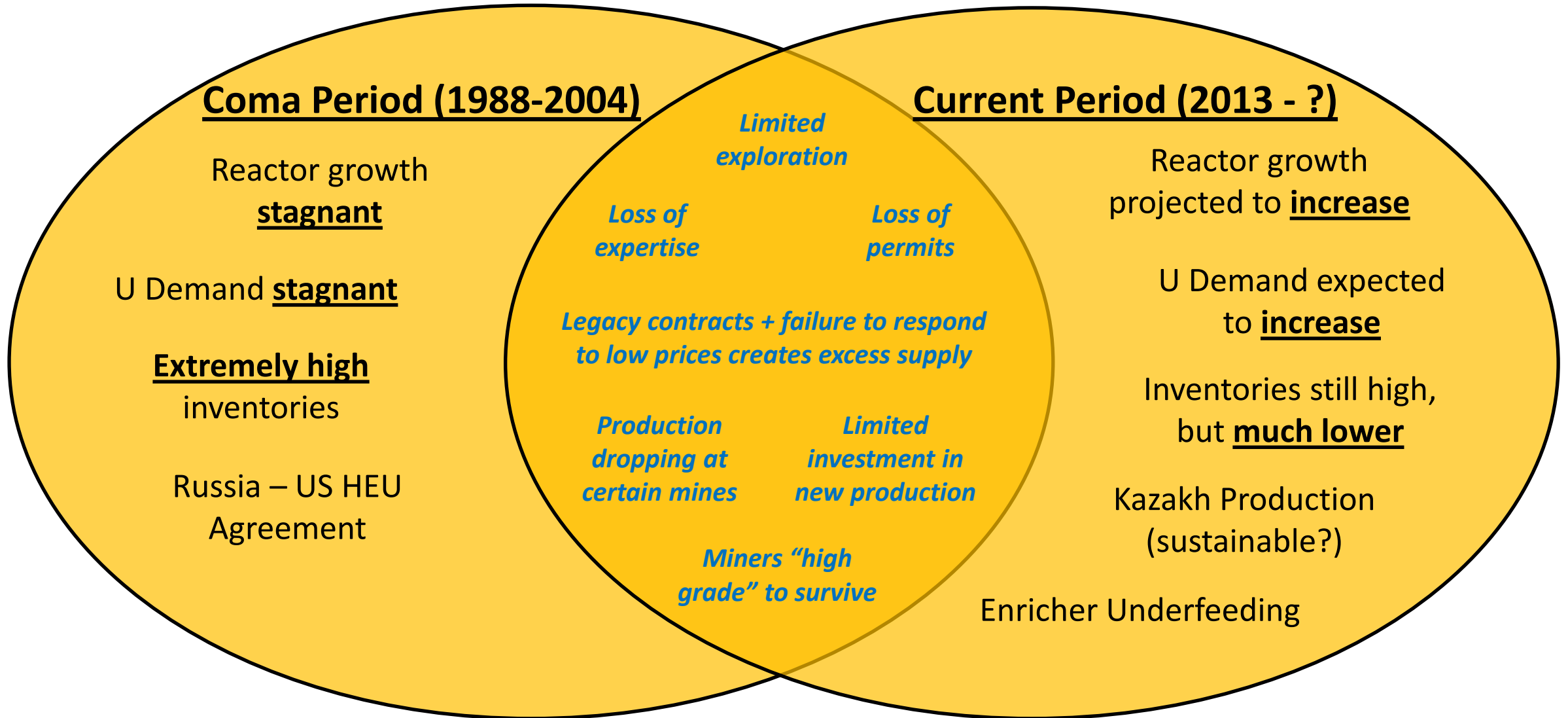
- ▲ Limited investment in new uranium projects
- ▲ Mines shutting down or being placed on care & maintenance
Rabbit Lake, Smith Ranch, Crow Butte, Willow Creek, Ranger, Kayelekera, Honeymoon, and smaller mines in USA & elsewhere
- ▲ Clear evidence that many “established” and “new” producers are struggling to survive

Differences

- ▲ Reactor growth, uranium demand, and forward-demand forecasts – **all increasing (not stagnant)**
- ▲ Excess inventories loom – but levels are substantially lower than in 1990
- ▲ Production not being replaced through exploration
~1.7 billion lbs. produced since 2004 (most low-cost) ... less than ½ replaced by new discoveries (unknown cost)

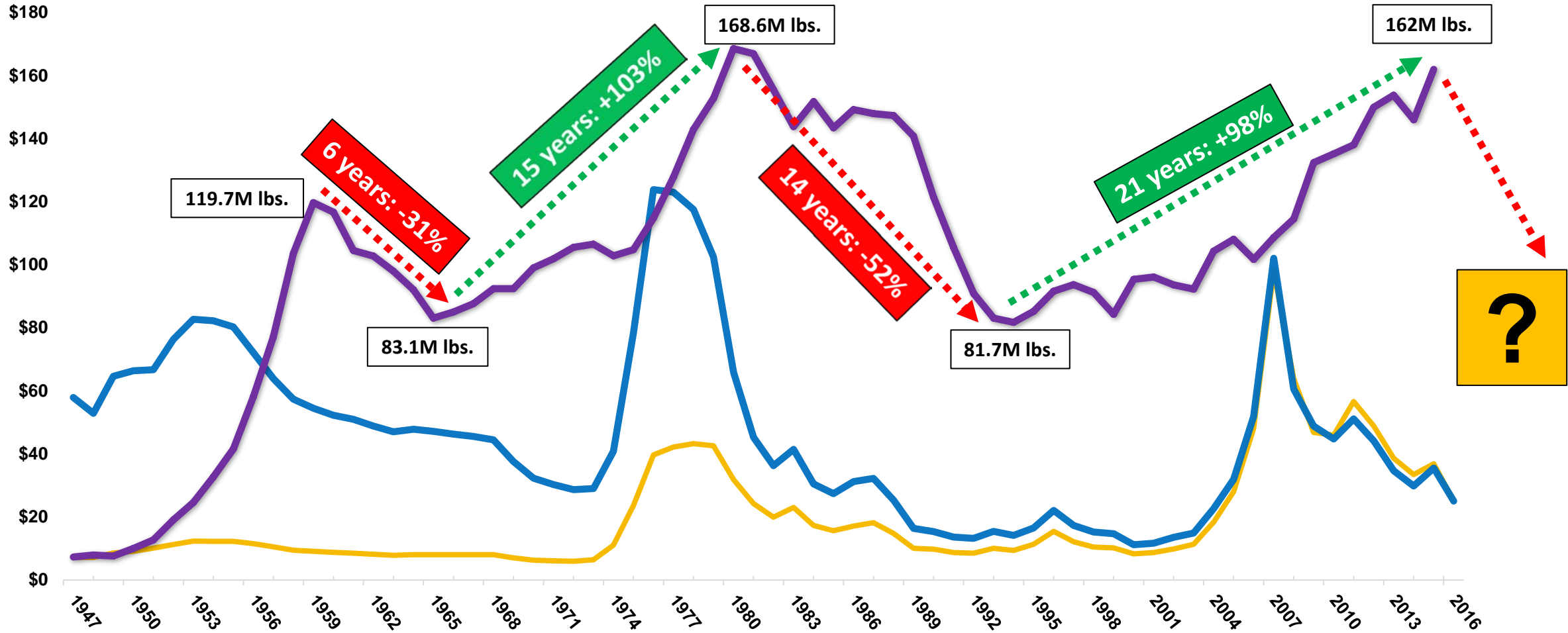
If history is relevant, we are now **9 years** past the previous peak (2007)

This should result in a drop in production



Prices Matter

Eventually Supply Responded to Prices – With a Lag



Conclusions

Future uranium supply at risk



- ▲ Most existing uranium production is unsustainable at today's depressed prices
At least 75% of current mine production is underwater at current spot prices
- ▲ Once legacy LT sales contracts expire (2017 – 2018), many mines will close
- ▲ Production will not increase quickly enough when the market calls for it
Exploration, permitting, feasibility, financing, construction, ramp-up for a major mine = 5 to 10+ years
- ▲ There are no new “Kazakhstans” on the horizon to bail-out the nuclear industry
- ▲ Current + future projects need higher prices (US\$50/Lb.+) to justify production
Cost of exploration, permitting, upfront and sustaining capital, OPEX, past high-grading, risk, and (gasp!) profits
- ▲ Even at higher prices, a number of expected projects will not contribute to supply
History indicates that less than 22% of planned new mine production will actually come into the market

Not Included

Supply disruptions, mine accidents, technical problems, geopolitical issues, labor disputes, contract defaults ...

Will history repeat?



Today's severely depressed uranium prices are creating conditions that may result in a supply shortage ... and another price spike

... we'll all find out soon enough!

About Mark Chalmers

- ▲ **40-Year Career in Uranium Production Industry:**
15 Producing Uranium Projects in 5 countries
- ▲ **Started in the Uranium Business in 1976 as a Miner**
Graduated as a Mining Engineer in 1980 from University of Arizona
- ▲ **During the Past 20 Years:**
Heathgate Resources – Beverley/Four Mile Mines in Australia
Paladin Energy – Langer Heinrich and Kayelekera Mines in Africa
Cameco Corp. – Highland Mine in USA
Past Consultant to Marubeni, BHP Billiton, Rio Tinto and Others
- ▲ **Since July 1, 2016, with Energy Fuels Inc. as Chief Operating Officer**
White Mesa Mill (Utah)
Nichols Ranch ISR Project (Wyoming)
Alta Mesa ISR Project (Texas)