



World Nuclear Association Annual Symposium  
4-6 September 2002 - London

## **Pricing in the Uranium Market**

Dr. Moukhtar E. Dzhakishev

In this paper, I would like to outline some considerations on pricing in the nuclear fuel cycle market in the light of its future development.

Many of you in this audience have years of experience in this market, so I will not take your time talking about the economic theory of pricing. I would like just to present KAZATOMPROM's view on the question of pricing in the uranium market.

If our previous report was comprised exclusively of facts verification, in this one we would like to put some rhetorical questions. For a start, we would like to ask:

- Who in this auditorium is interested in uncertainty of prices for natural uranium? We think nobody, except, perhaps, some marketing specialists who like to read the tea-leaves.
- Who in this room is interested in stable and predictable prices for natural uranium? We think all of us.

If you agree with our answers to these rhetorical questions, let us ask some particularly practical ones.

- Why is the spot volumes sale price considered as the main uranium market price indicator?
- Why are the long-term contract prices guided by it?
- Why is only TradeTech's indicator related to the long-term price from all published ones, and the rest – to the spot price?

During the transition to a free nuclear fuel market, utilities must compete with alternative energy sources, where the fuel price forecasts are more or less reliable, and both the cost of fuel and kilowatts of energy are easily calculated with a certain level of accuracy.

For nuclear power and the entire nuclear industry to compete successfully with other energy sources, nuclear utilities must have clear economic policies, and the uranium producing industry must be optimally streamlined. For this purpose, it is necessary to ensure that the forecasts are reliable and the production cost of uranium is properly understood.

The existing pricing system in the nuclear fuel market is quite primitive and does not currently reflect the true production cost. In fact, the industry has no clear price indicator, which would allow producers to make quick and effective decisions.

There are many factors which interfere with the determination of the market price of uranium: it is a specific product with its trade restrictions. Inventories are sold at prices not related to the actual production cost; the quantities are relatively small; and trade is often sporadic.

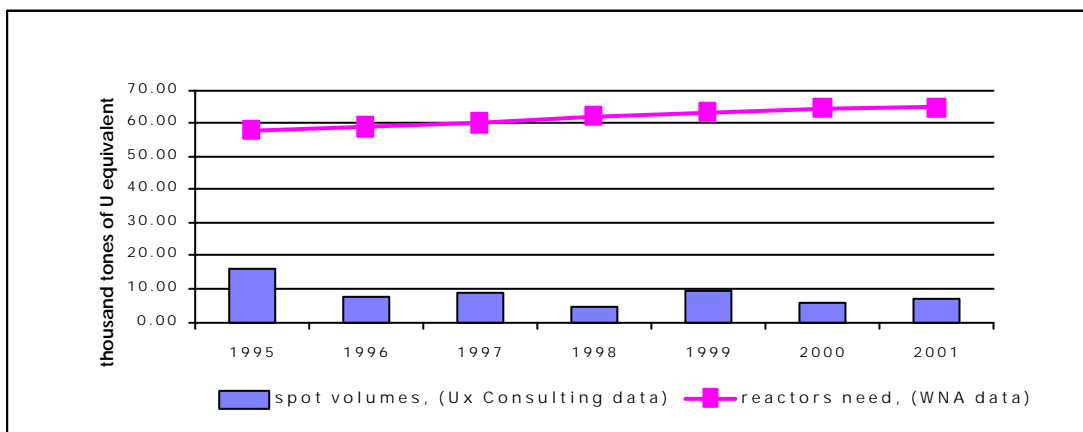
As discussed in a paper at a WNA meeting in Toronto last year (*Analysis of raw materials base and uranium production for the decade*, M. Dzhakishev, WNA, 2001), a shortage of uranium is expected in the near future, and, as inventories run out, the market price will grow along with production costs.

The spot market meets only a minor part of the world nuclear reactors' requirements. *Figure 1* displays the ratio of annual spot quantities to world demand.

Existing prices are evolving in the restricted market place of the spot market, which exists on its own and apart from the nuclear industry. Current long-term price indicators simply correlate to spot prices. Let us look at the future of our industry and ask: to what extent does present pricing reflect nuclear energy processes?

Published spot prices are nothing but a snapshot of the market conditions at their publication date. However, these prices do not illustrate the entire market but only a small part of it – approximately one-tenth, (Figure 1).

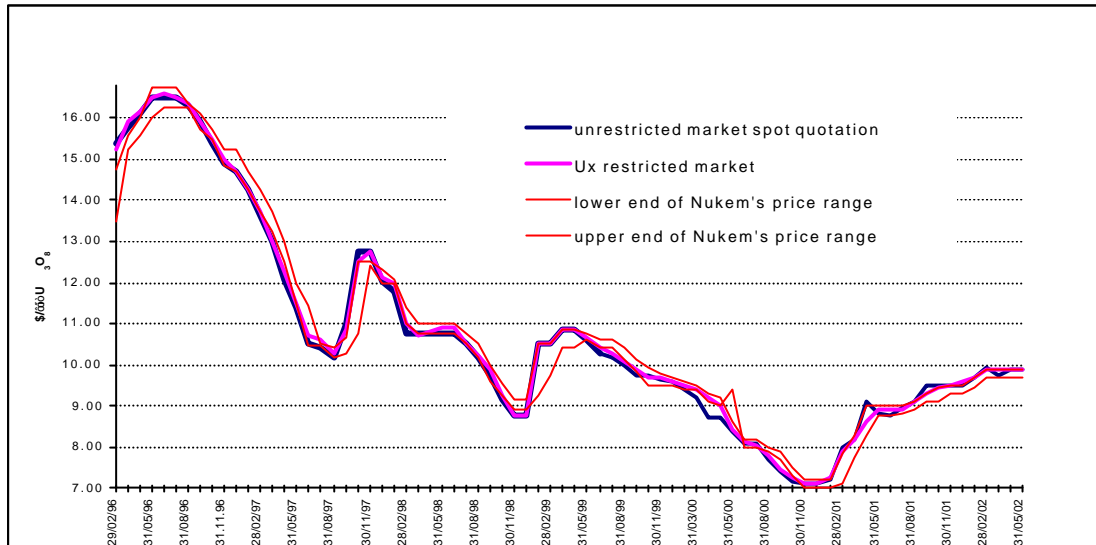
Figure 1. World's reactors requirements and spot market sales volumes (WNA and Ux Consulting data)



Because they are published, the spot price indicators are well known far beyond the uranium industry as the 'face' of the industry. Characteristics of uranium price indicators are described in detail in D. Garrow's *Uranium Price Formation* and the Nukem article *Price Formation: Future Imperfect*. [4,5]

All published spot price indicators are very close to each other in value. *Figure 2* demonstrates that the Ux and TradeTech prices are very similar. This is not due to particular features in spot price determination by either company – the important point is what they reflect.

Figure 2. TradeTech, UxC and Nukem spot prices, 1996-2002



These price indicators are derived from opinion polls. Ux, TradeTech and Nukem ask market participants about current and most probable expected prices. The procedures are described in detail in M Knapik's *Spot Uranium Pricing Indicators*. [3]

In the year 2001, Western European consumers purchased only 4% of uranium in the spot market. Thus, it looks as if we are all extremely interested in information concerning the price at which these 4% were sold, while the price of the remaining 96% is not that important for us.

We will not discuss here other published price indicators, such as those of Nuclear Fuel or UPIS. They have been discussed many times in Nukem and Ux reports.

Let us consider the spot prices diagram (Figure 2). Who can tell that this is the price for raw materials, the reliability of deliveries of which is of primary importance?

What bank will fund investments for production of goods with such an uncertain profitability?

How, looking at this figure, could we believe that nuclear power plants would provide the most reliable energy supply? We suggest that this diagram is not shown to anyone anymore. Let it be our secret.

But while it is still before you, let us draw your attention once again to the factors that determine the spot market prices.

- Spot volumes take about 10%. Any slight variation of demand and supply has a significant effect on price.

- Planned uranium deliveries are made by producers under long-term contracts. Sellers and buyers could show up in the spot market under the influence of random factors, such as planning mistakes, need in current liquidity support, availability of excessive inventories as a result of inventories, formation policy change, etc. The prices of spot market participants are orientated only on the current situation and not dictated by needs for the provision of normal production processes.
- Flexibility in volumes in contracts leads to swinging spot prices. If a price in the spot market goes up, the utilities try to buy the maximum of uranium in accordance with given flexibility, so uranium supply reduces and the price goes higher. If the price goes down, the utilities buy less uranium, releasing surpluses, which beat down the price in the spot market even more.

We will not go into details of economic theory, but we all know that the price is the most important instrument providing balanced development of industry in accordance with actual public needs in these goods. If the spot price is subject to the random factors and does not reflect the price of bulk uranium being sold, if it has a destabilizing mechanism in it, how can it provide balanced development? The more the spot price confuses us and the less production is oriented on consumption, the more we all lose money, thus, losing the competitive ability of the entire atomic energy industry.

We all remember very well the drastic increase in prices in 1995-1996. The industry's inertia was quite surprising: the price continued to rise from US\$7.20 (US\$7.20-9.60) per pound in January 1995 to (US\$15.50-16.60) US\$16.00 in May 1996. But what had really happened? NUEXCO's bankruptcy neither demolished producers' capacity nor increased reactors' requirements. All the market fundamentals remained the same as in 1994.

As F. Bamford noted in his article *Achieving Order in a Chaotic Uranium Industry* [2]: 'Few markets in the world could survive in an orderly fashion this fast succession of extreme boom in demand followed by extreme slump'. Note, however, that this was 1985. The market was better organized compared to the 1990s, when the nuclear industry faced large inventories from new ex-Soviet suppliers entering the market. Sales of the state-owned inventories created greater uncertainty in the market than had existed in 1985. However, the market has always been chaotic and unstable. *The reason for such instability is the pricing system itself.*

Someone in his turn may ask : 'If you don't like the spot price so much, what can you provide instead?' The answer is quite simple. We suggest all the uranium market information agencies publish price indicators of basic volumes of product sold, namely long-term contract prices, along with the spot price.

Some problems may arise in the calculation of such indicators. The first one lies in the secret nature of information on long-term contracts. It is true that during the process of long-term contracts conclusion, companies carry on slow, and therefore, confidential negotiations. It does not mean that long-term contracts confidentiality is of such importance for the uranium market participants. We suggest to all members of the World Nuclear Association that, in order to help

---

experts in search of information, they sign a convention on publishing basic information on all the concluded long-term contracts. If we, for whatever reason, cannot establish a uranium exchange, let us use some of the advantages of exchange trade, namely openness of the basic information, for all market participants. This would be a considerable effort in joining up our corporate interests.

The second problem is that the long-term contracts include more complex terms and conditions which make it difficult to reduce them to one indicator. We think that this is better, even if the experts make mistakes in the reduction method, than keep secret basic information regarding uranium market prices.

Statements in the mass media relating to the industry, concerns or expectations of market participants – all these result in spot price fluctuations. And it is not always clear what drives buyers' and sellers' opinions. But we can certainly tell that the spot prices:

- have nothing to do with the production costs at the contracting time, nor those at the delivery date;
- bear no relation to prices actually used for present sales of major quantities of uranium;
- give no idea about production prospects, or current and future capacity to meet nuclear energy needs.

In any case, the published spot prices are indicators of the condition of the uranium market for market participants and for the whole nuclear community. A spot price is usually a reference point when concluding spot and long-term contracts, and it influences investors and financial companies who deal with uranium-related companies. We recall that the largest producers' shares went up during the increase in prices in 1995-1996. Investment flew into the industry not because they would pay back after the inventories completely ran out, but due to short-term increases in prices. This means that the spot market controls the uranium industry. This paradoxical fact testifies that the cause-and-effect relation in the industry has failed. Mr. Dustin Garrow, President of ZB Marketing, in his *Uranium Price Formation and Reporting* neatly pointed out that the 'tail of the spot market, actually the tip of the tail,' wags 'the uranium industry dog'.

Everyone who has ever spoken using a microphone knows that if a sound source is too close to speakers, the signal will distort (even a weak signal, for example, the speaker's own breath, may be transformed into a horrible squeal), and when exposed to multiple amplification, a faint input signal creates great distortion. As a result, we hear a sound which has nothing in common with the input signal. In physics this effect is called 'a positive feedback', which is a symptom of a system's instability. Its danger is in its self-exciting nature, and its spontaneous occurrence may lead to unpredictable consequences, including a system crisis.

The spot market is a system supposed to transform signals of nuclear energy and uranium producing industry into objective price indicators available to all market participants. For the industry's stability, it is vital that signals are not distorted, but remain adequate to development trends. We need protection from an unintentional spontaneous signal.

But why, being aware of its destructive nature, are we still basing all the reports on the uranium market situation with on spot prices? It is because we are following the model proposed by other markets and by people far from the uranium industry.

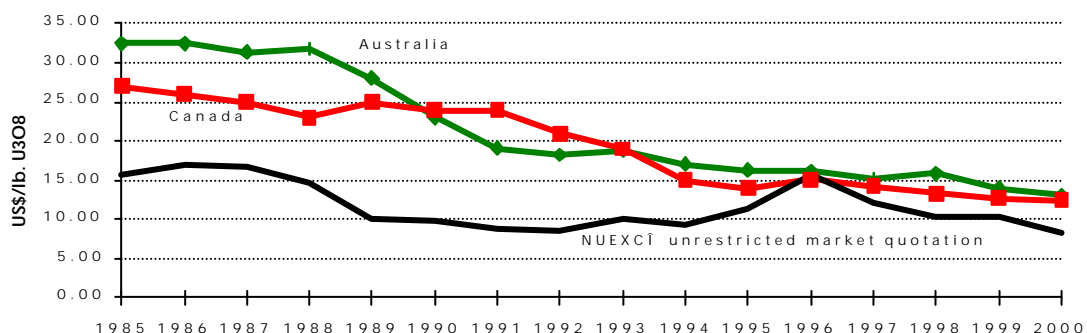
Indeed, the spot price is defined as a price at which a 'significant' amount of goods could be bought 'at once'. For many goods this definition provides a reliable enough indicator of market opportunities, since great volumes of these goods are bought under spot contracts. Drawing on other markets' experience, the financial community and the public consider spot price as the most topical indicator.

But the main participants of the uranium market do not need uranium 'at once'. They simply do not purchase significant amounts in the spot market. Long-term contract volumes amount to more than 1000 tonnes and in the spot market those seldom exceed 200 tonnes. So, how can we talk about significant amounts in the spot market? This definition of the main uranium market price indicator simply makes no sense. We understand it and we often are cunning during the negotiations by appealing to the spot prices.

At the same time, it is the indicator, if not senseless but narrowly limited, on which the community's idea of the market condition is based. As Mr. D. Garrow said in his report: 'Like it or not, the financial community including investment bankers, shareholders (private and institutional) as well as the public at large, consider the uranium spot market price as a barometer to gauge the industry's financial health and prospects'. So, by copying pricing of other markets, we mislead our shareholders and financiers. It could be justifiable if we used it to achieve our goals. But we are just biting the hand that feeds us.

Sensible price indicators for uranium sold in the world market can be derived from the statistics of governmental agencies such as EURATOM, US Department of Energy, Australian Statistics of Minerals (ABARE), and Natural Resources of Canada.

Figure 3. Canadian and Australian producers uranium export prices (NRCan and ABARE data)



These agencies use the export and import documents of their countries and data collected from direct polls of related companies. Their publications provide real prices applicable to quantities sold. However, their weighted average prices for

---

the previous year provide a historical flashback, which is irrelevant to current market parameters. No one uses these weighted average prices as an argument in negotiating a contract. Lack of a real exchange to trade major quantities makes it impossible to say clearly how much uranium costs today.

NYNCO's attempt to introduce an Electronic Exchange is also very interesting. Although it might be a prototype of the future system for uranium trade, it currently works with too small quantities to influence the industry. Besides, it is unable to influence the pricing, since the exchange does not publish transactions records.

The present pricing mechanism is a snapshot of the current market situation. It shows no relation to production cost and offers no prognosis for the development of the industry. If such pricing continues, the outcome will be a drastic rise in uranium prices, since it makes it impossible for producers to provide nuclear utilities with sufficient nuclear fuel.

Spot price is not a market price at all: it is speculative. Speculative sales may shoot up or prices drop as a result of absolutely private egotistical undertakings, which might damage the entire industry. Therefore, at a time of generally expected shortages of uranium we must find a way of determining a real market price for uranium, i.e. the price actually being paid for major quantities of uranium. The entire uranium market is a complex mechanism where spot and long- and medium-term contracts are mixed together within a wide range of prices. All in all, it is an integrated system of several elements. Long-term fixed price deliveries are also directly related to the current market because mines would not be operating without a contract. And the quantity of fresh uranium available today would have been much smaller.

We believe that the industry is in need of a new indicator, which will reflect the real price of uranium sold at present. We encourage the companies which publish uranium prices to undertake the creation of such a new price indicator. It should be neither spot nor term price, let us call it 'uranium real price indicator'. In order for this indicator to be an actual reference point for producers, consumers and investors it should:

1. reflect selling prices for the reported period for the main proportion of uranium mined in the world;
2. be published regularly for the benefit of market participants;
3. be related to certain standard delivery terms: it would perhaps be worth creating a mathematical tool which would adapt different delivery price information inputs and generate an adjusted price.

The above conditions are prerequisites for a new price indicator to provide the industry with proper order. It would also enable nuclear utilities to estimate realistically their future expenses for fuel, and producers to utilise their resources rationally.

We will then see the following three qualitative characteristics of the market situation:

- Spot Price is a price for quick sales, where a seller offers a discount in order to market his product as soon as possible. Just as a person urged to sell his apartment will not get the real price for it, so it is with the spot market when uranium inventories and the extra quantities accumulated by sellers as a result of buyers acting flexibly enter the market.
- Long Term Price is a future price for uranium, based on production cost projections.
- Real Price is the actual value of uranium presently sold. It will help to locate a contract price for uncommitted uranium planned for production currently and for the following year. The Real Price will also enable nuclear utilities to determine more accurately their economic strategy.

Returning again to the analogy of a malfunction in an acoustic system, we believe that what we propose will break the 'positive feedback' and filter out the noise. Then we will be able to hear clear signals: pricing mechanisms will be reflecting current developments in the nuclear energy and the uranium producing industries.

**REFERENCES:**

1. George White, Jr., *Uranium Through the Looking Glass* presentation before the Atomic Industrial Forum Uranium Seminar in October 1984.
2. Frank W. Bamford, *Achieving Order in a Chaotic Uranium Industry*, Nuclear Engineering International, May 1985.
3. Michael Knapik, Spot Uranium Pricing Indicators presentation before the 1992 Uranium Institute Symposium.
4. Dustin J. Garrow, President ZB Marketing, LLC *Uranium Price Formation and Reporting*, NEI September 2001.
5. Nukem Market Report, *Uranium Pricing: Future Imperfect*, December 2001.