URANIUM MINING
IN THE CZECH REPUBLIC

The Festival of the Future in Berlin, Germany

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Calla - Association for Preservation of the Environment
OUTLINE

- **Milestones**: Raw Material Policy 1999 vs. mining in Dolní Rožínka
- **Uranium facts**: production, employment
- **Uranium mining sites**: Jáchymov, Příbram, MAPE Mydlovary, Stráž pod Ralskem, Dolní Rožínka
- **State subsidies**: a phase-out plan & social and health costs
- **Environmental impact**
- **Unmined uranium deposits**
- **Brzkov**: a new uranium mining?
- **CALLA’s vision for the year 2030 (in response to a request by BMUB)**
- **Faces of Uranium**
- **The siting process for a** Geological Disposal Facility (GDF) for radwaste and spent fuel
- **Calla’s activities**
- **Farewell**
MILESTONES – URANIUM MINING 1945-1999

- **1945, Nov 23** – international agreement between the Czechoslovak Republic and the Soviet Union about **prospecting, extraction and supply of radioactive materials to the Soviet Union** (e.g. uranium concentrate powder "yellowcake")

- **1945-1992** - **Czechoslovak Uranium Industry** (Československý uranový průmysl, ČSUP) - the state enterprise **in charge of** all uranium activities

- **1989, Oct 19** – Czechoslovak Socialist Government Bureau adopted **Resolution No. 94 on the URANIUM MINING PHASE-OUT**

- **1993-onwards** - the state enterprise **DIAMO in charge of** all uranium activities

- **The Raw Material Policy 1999**
  - = the fundamental conceptual national document in relation to mineral resources and raw materials ...

Source: DIAMO
THE RAW MATERIAL POLICY 1999

- “To terminate uranium mining and ensure the protection of its major resources for possible future use”

- “To ensure remediation of the long-term consequences of uranium mining”

Source: Ministry of Industry and Trade
VS. CONTINUOUS URANIUM MINING AND PROCESSING IN DOLNÍ ROŽÍNKA

- **2005** - Government Resolution No. 1316 (the Rožná mine)
- **2006-2007** - 1st round of request by the Australian Urania Mining Ltd. to extend the protected deposit area in Brzkov (refused by the Ministry of the Environment)
- **2007** – Gov. Res. No. 565 (the Rožná mine)
- **2014** – Gov. Res. No. 1086 (the Brzkov mine)

Source: The Ux Consulting Company, LLC
RANKING OF WORLD URANIUM PRODUCERS 1945 - 2007

Source: DIAMO

IN 2014:
193 t/year
= 0.35 %
(the mine ROŽNÁ)

Source: World Nuclear Association
URANIUM PRODUCTION 1946 - 2007

- cca 112 thousand t of $\text{U}_3\text{O}_8$ produced till 2016
- 110 t of $\text{U}_3\text{O}_8$ in 2016

Source: DIAMO
Max. 46,351 employees in 1955, about 3,300 employees per year after 2004
THE EMPLOYMENT & URANIUM PRODUCTION
1946 - 1996

Source: lc.century.cz
ALL URANIUM MINING SITES

- Deep uranium mining
- In situ leaching (ISL)
- Radiometric sorting plant
- Chemical processing plant

Map: DIAMO
JÁCHYMOV 1948 -1962

- Jáchymov mines - cca 7,000 t of U extracted
  - Liquidation of mines after 1964 and 2009
- tailings ponds Eliáš + Nejdek (surface and groundwater contamination)
- radiometric sorting plant of U ore (from Jáchymov, Horní Slavkov, Zadní Chodov and Příbram mines)

Interesting facts:
- The “Death Tower“ - political prisoners dying of radiation disease in 1950s
- The first Soviet atomic bomb made from the Jáchymov uranium
- 1906 - the first radon spa in the world (still in operation nowadays)
- 1898 - the discovery of radium by Marie Sklodowska Curie in Jáchymov
- since 1516 - uranium mining as a by-product of silver ore mining

Source: DIAMO & Hornictvi.info
JÁCHYMOV 1948 -1962

Left: The “Death Tower“. Right: Deep Uranium Mine Svornost | Foto: © Václav Vašků
PŘÍBRAM 1950-1991

- Příbram mines of 57.6 km²
- 48,432 t of U processed at
  - physical processing plant in Bytíz from 1958
  - chemical treatment plant in MAPE Mydlovary from 1962
- tailings ponds in Bytíz – clean-ups after 1993 (Tomas, 2001)
- large waste rock piles
- Interesting facts:
  - political prisoners in a labour camp Tábor Vojna
  - still cca 13 mil t of waste rocks with cca 700 t of U in it in 2015 (iDnes, 2015)

Source: DIAMO
PŘÍBRAM 1950-1991

Left: Waste Rock Piles. Right: Labour Camp Tábor Vojna with a former prisoner

Foto: © Václav Vašků
MAPE MYDLOVARY 1962-1991

- **Chemical treatment plant**
  - processed 17 mil t of U (from 5 sites: Zadní Chodov, Okrouhlá Radouň, Příbram, Dolní Rožínka, Stráž pod Ralskem)
  - 1979-1983 processed over 700 thousand t of U/year
  - produced 28,000 t of U₃O₈
  - Tailings ponds - 36 mil m³ of radioactive sludge (24 sludge/17 water) on 286 ha

- **Interesting facts** (Source: Vacek - MAPE Mydlovary, 2015):
  - 6 decontamination stations filter 20-50 thousand m³ of water from tailings ponds per year
  - Cca 150 ha still need to be recultivated by cca 2024
  - Costs of recultivation: 120 mil CZK = 4.4 mil EUR in 2015

➤ **TOTAL REMEDIATION COSTS BY 2024:**
2-4 bill CZK = 74 - 148 mil EUR

Source: Švehla, 2008
Up: Ongoing recultivation of tailings pond III. in 2015 (31 ha; ash, tires, municipal waste, clay, compost, grass).

Down: Recultivated tailings pond I. in 2015 (25 ha, 25 m high, cca 100 monitoring drill holes) | Foto: © Olga Kališová
MAPE MYDLOVARY 1990 vs. 2015

Source: VDP CÚZK, 1990
STRÁŽ POD RALSKEM 1966-1996

- **Deep uranium mining** in Hamr pod Ralskem (1972-1993)
  - Cca 13,000 t of U
  - Complete liquidation of the mine in 2015

- **IN SITU LEACHING (ISL)!** – chemical uranium mining
  - 1966 – 1996
  - 15,000 t of U >> 30,000 t of $U_3O_8$
  - Chemical processing plant in liquidation

Source: [Mužák](#) – DIAMO, 2008
STRÁŽ POD RALSKEM 1966-1996

DRINKING WATER SOURCE
- chalk deposits from Turon (a geological level of the Upper Cretaceous 93 - 89 Ma before present)

BARRIER LAYER

URANIUM MINERALIZATION
- chalk deposits from Cenoman (the early Late Cretaceous 99 - 93 Ma before present)

Naše Podještědí NGO, 2015
STRÁŽ POD RALSKEM 1966-1996

370 mil m³ groundwater contaminated in 2009 by 5 mil contaminants (mainly sulphuric acid)
//compared with 193 mil m³ in 1994//

CONTAMINATED CENOMANIAN AQUIFER by SULPHURIC ACID in 2006 (the lower green layer with uranium mineralization)

Source: Naše Podještědí NGO, 2015
STRÁŽ POD RALSKEM 1966-1996

CONTAMINATED TURONIAN AQUIFER with SULPHURIC ACID in 2006 (the upper yellow layer with drinking water)

Source: Naše Podještědí NGO, 2015
STRÁŽ POD RALSKEM
NEUTRALISATION DECONTAMINATION STATION (NDS) after 2013

NDS 2006-2014: over 700,000 t of contaminants processed
NDS till 2037: - processing 80,000 - 160,000 t contaminants/year

Source: Mužák – DIAMO, 2008
STRÁŽ POD RALSKEM / IN-SITU LEACHING SCHEDULE AND COSTS OF CLEAN-UPS AND REMEDIATION

- **PLANNED SCHEDULE FOR FINISHING THE CLEAN-UPS:**
  - Turonian aquifer – 2017
  - Cenomanian aquifer – 2037
- **TARGET = 7 g of contaminants per litre**
- **PLANNED SCHEDULE FOR FINISHING THE REMEDIATION:**
  - 2042
- **COSTS SO FAR**
  - 1996-2015: cca 20 bill CZK = 740 mil EUR
  - 2012-2042: cca 31 bill CZK = 1 bill EUR

Source: DIAMO, 2012
STRÁŽ POD RALSKEM – MINE HAMR I.

Left: A view from the top of NDS at the tailings pond (100 ha) where the radioactive waste from the mine Hamr I. will be disposed of (cca 7 mil m³) until 2023. | Foto: © Olga Kališová, 2015

Right: The Hamr I. mine – now liquidated (COSTS OF 619 mil CZK = 22 mil EUR) | Foto: © Václav Vašků
DOLNÍ ROŽÍNKA 1958 – 2017

• Deep uranium mining in Rožná: cca 18,500 t of U extracted before 2007, max. 200 t/year since 2007
• Chemical treatment plant since 1968
• tailings ponds K1 and K2 with cca 10 mil m³ of sludge on 90 ha

Source: DIAMO & Faces of Uranium, 2009
MINING AT ROŽNÁ SHOULD FINISH IN 2017

Source: Ministry of Industry and Trade

The Mine Rožná | Foto: © Václav Vašků
DOLNÍ ROŽÍNKA 1958 – 2017

Chemical processing plant | Foto: © Olga Kališová, 2014

Tailings ponds K1 (up) and K2 (below) | Foto: © Václav Vašků
TAILINGS PONDS K1 & K2 IN DOLNÍ ROŽÍNKA

- DIAMO and the Ministry of Industry and Trade conceal the information regarding:

1. Identification and estimation of the significance of impacts of construction and operation on population and the environment

2. Increasing the capacity of tailings ponds in connection with possible new mining in Brzkov

3. Slope stability calculations

Source: Sequens, 2015

Source of image: Obscuredbyclouds.com.au
STATE SUBSIDIES – a PHASE-OUT PLAN & MANDATORY SOCIAL AND HEALTH COSTS

17.6 billion CZK (650 mil EUR) from 1992-2003

After 2004 no longer monitored how much subsidies for uranium mining (all industries (coal, ores, uranium) merged into one category “MINING IN TOTAL“ !)

Source: Czech Geology Service pp.135, 2014
## ENVIRONMENTAL IMPACT OF URANIUM MINING in 2015

<table>
<thead>
<tr>
<th></th>
<th>Volume in mil. m³</th>
<th>Area in mil. m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste rock piles</td>
<td>50</td>
<td>4.7</td>
</tr>
<tr>
<td>Tailings ponds</td>
<td>52.9</td>
<td>5.9</td>
</tr>
</tbody>
</table>

Source: DIAMO – Table 6.1-2, 2015
NOT COMPLETELY MINED OUT YET…

RED SITES IN THE MAP:

Highlands:
1. Rožná
2. Brzkov
5. Jasenice-Pucov

Northern Bohemia:
3. Břevniště pod Ralskem
4. Hamr pod Ralskem
6. Osečná Kotel
7. Stráž pod Ralskem
- up to 112 thousand t of U.

The majority of the deposit possible to be mined only using ISL method again!!!
Government Resolution No. 1086 dated December 22, 2014: to start preparations for a new uranium mining. VS. THE RAW MATERIAL POLICY 1999

- a draft of new Policy dated Dec 2015 is pro-uranium mining
- However, HAS NOT BEEN APPROVED YET!

- the deposit of Brzkov - Horní Věžnice
  - exploration work carried out from 1976 to 1990
  - experimental mining since 1984
  - protected deposit area (CHLÚ) of 106.4 ha declared in 1990
  - the mine flooded and the pit backfilled in 2004

Source: DIAMO a Ministry of Industry and Trade
HOW MUCH OF URANIUM IN BRZKOV?

- According to the optimal scenario of the "Assessment of the preparation for opening the deposit of Brzkov – Věžnice" by GEAM DIAMO dated July 2014:
  - 4,440 t of extractable Uranium
  - Max. 175 t of U to be mined per year

- Dukovany & Temelín NPPs need cca 600 t of U per year
  - 4,440 t from the Brzkov-Horní Věžnice deposit would cover only cca 7 years of both NPPs’ operation
The economics of the project?

- Government’s decision how to finance the construction of the mine & reconstruction of the chemical treatment plant and tailings ponds in Dolní Rožínka (ABOUT 3 bill CZK = 111 mil EUR) should be taken by January 2018 (possible mining after 2022).

Positive economy of the exploitation only if 4,440 t of U are extracted at the price higher than USD 60/lb of U₃O₈.

If less than 4,440 t of U are extracted, the price at least USD 90/lb of U₃O₈.

Source: ČSOB Advisory

Source: The Ux Consulting Company, LLC
The Examples of Locals’ Protests

Actions Against New Uranium Mining

| Foto: © Olga Kališová
The extension of CHLÚ = a step closer to the mining and the obstacle for the development of the municipality

- the extension of CHLÚ should have been finished by August 2015, but is not

- 4 municipalities (of Brzkov, Věžnice, Polná and Přibyslav) & 4 private landowners & Our Future Without Uranium NGO /all represented by the attorney Kliment/ highlighted the shortcomings of the DIAMO’s procedure

- the Ministry of the Environment gave DIAMO the one-year deadline (by June 30, 2017) to obtain the missing documents in order to be able to apply for the extension of CHLÚ

- More on Brzkov: www.nuclear-heritage.net

Source: Brzkov, August 30, 2016
THE REAL CAUSE BEHIND MINING 4,440 T OF U IN BRZKOV?

- DIAMO gaining time before getting at the uranium reserves near Stráž pod Ralskem – 8 deposits with up to 112 thousand t of U

- Project TB010CBU002 commissioned by the Czech Technological Agency and conducted by MEGA Ltd. And Masaryk University in Brno from 2012 to 2014: “New technological possibilities of mining uranium deposits in the Czech Republic with respect to minimizing environmental impact and providing a legislative backup“
  - it recommended the method of in-situ leaching (!)
  - the Government took the final report of the project into account on Dec 22, 2014

Source: Sequens, 2015
1. What is CALLA’s vision for the year 2030 in relation to the uranium industry in the CZ?

- NO uranium mining
- Remediation works – not completed yet, but clearly earmarked financial resources reserved for them
- Civil society (CS) realizes that jobs can be created otherwise than by irreversible destruction of the environment & health
- NO expansion of two existing Nuclear Power Plants (NPPs) – their costly decommissioning instead

- **Transformation of the Czech energy sector towards Renewable Energy**
2. What kind of environmental challenges and which need for action do you see within the uranium industry in the CZ?

- **CHALLENGES:**
  - Remediation works must not be rushed, but must be dealt with diligently & with full attention and focus
  - Accessibility of impartial & unbiased information on the remediation process

- **NEED FOR ACTION:**
  - A vibrant & awakened civil society worldwide
  - International & local non-governmental (NGO) networking with policy makers
  - Financial & other support for NGO projects
3. Which political steps are necessary in your view, to make your vision real?

- The Czech Raw Material Policy: “no new uranium mining in the future”
- National Planning Policy Framework: remediation works with official deadlines for their implementation, including cost estimates
- Carbon tax & external costs & the whole nuclear cycle reflected truly in the cost of nuclear (& coal) power > renewables no longer need to be subsidized in order to be competitive on the market
- Electing policy makers with no short-term financial gains, but with long-term objectives of real energy autonomy and nature conservation - will lead a constructive dialogue with CS whom they will respect as their equal
  - Requires people (CS) who
    - understand interconnectedness and a causal relationship between their action
    - protect nature & their health
    - know the right tools to defend themselves against those who are still “OUT OF TUNE”
Faces of Uranium (2009)

- Photos by a photographer Václav Vašků
- Photo exhibitions co-organized by Calla since 2009
- Publication “Faces of Uranium” (photos with captions)
Radioactive Waste Repository Authority (RAWRA/SÚRAO) has selected **THE SEVEN SITES** for a GDF.

**THE TWO SITES** near the Dukovany and Temelín NPPs are also being considered.

RAWRA wants to select the final site by 2025, however, is behind the schedule due to the public resistance etc.

More on "**WE DO NOT WANT A GDF**" [www.nechcemeuloziste.cz](http://www.nechcemeuloziste.cz)
CALLA’S ACTIVITIES RELATED TO URANIUM

- Participation in administrative proceedings (such as in relation to a SEA on the Draft Raw Material Policy dated 2015 and an EIA on uranium mining in Brzkov)
- Publication of newsletters, articles, press releases, brochures regarding mining and its health effects
- Networking with & consultation addressed to people affected by uranium events
- Participation in & co-organization of public debates (such as in Brzkov or Bystřice nad Pernštejnem) and seminars
- Regular updates of Calla.cz focused on uranium situation in the Czech Republic, Temelin.cz and Facebook Atomic State
- Distribution of up-to-date information via “uran-l” email
- Guided tours for locals and international activists and journalists
- Co-organization of photo exhibition Faces of Uranium since 2009

Public debate about a nuclear fuel plant with Peter Diehl and Dalibor Stráský in Bystřice n. P. on Oct 1, 2014 | Foto: © Olga Kališová
THANK YOU FOR LISTENING

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