Uranium Mining Projects:
Environmental Issues and Stakeholders Involvement
Current Situation in Argentina

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Presentation Outline

- NPPs in Argentina
- Legal framework for U mining cycle
- Environmental and social issues of the U mining cycle:
  - Uranium exploration projects
  - Uranium production projects
  - Former mining and milling plants
- Major public concerns regarding U mining
- Final remarks
NPPs in Argentina

- **a**
  - ATUCHA I
  - 357 MWe
  - Slightly Enriched U

- **b**
  - EMBALSE
  - 648 MWe
  - Natural U

- **c**
  - ATUCHA II
  - (under construction)
  - 745 MWe
  - Natural U
Legal Framework
U Mining Cycle

• Nuclear National Law
• Radioactive Waste National Law
• Argentinean Mining Code
• Regulatory Standard AR 2.12.1
• Environmental National and Local Legal Framework
In Argentina, national and local legal framework requires an Environmental Impact Assessment (EIA) previous to any stage of mining.

The preparation of an EIA provides ways for stakeholders to participate in the decision making process.

Stakeholders participation and their right to know is integrated into the basic regulations of the country, even in the Argentinean National Constitution.
Legal Framework
Environmental and Social Issues

General Process of Environmental Impact Assessment

1. Environmental Impact Study
2. Technical and Sectorial Advice
3. Public Hearing
4. Environmental Impact Statement
5. Environmental Audits
U Mining Cycle in Argentina

U Exploration Projects
Cerro Solo Deposit - Chubut

U Production Project (Stand By)
San Rafael Utility Complex - Mendoza

Former Mining and Milling Plants
Malargüe Site - Mendoza
U Exploration Projects

1. SALTA EXPLORATION PROSPECTS
2. CATAMARCA EXPLORATION PROSPECTS
3. LA RIOJA EXPLORATION PROSPECTS
4. CHUBUT EXPLORATION PROSPECTS
5. SANTA CRUZ EXPLORATION PROSPECTS
6. FRANCA DEPOSIT (CATAMARCA)
7. CERRO SOLO DEPOSIT (CHUBUT)
8. DON OTTO DEPOSIT (SALTA)
U Exploration Projects

Environmental Impact Studies are submitted to the Environmental Regulatory Authority
U Exploration Projects
Baseline Environmental Surveys

Airborne Gamma-Ray Spectrometry

Carborne Gamma-Ray Spectrometry

Ground Gamma-Ray Spectrometry

Meteorological data collection
U exploration Projects
Baseline Environmental Surveys

Water monitoring

Groundwater level monitoring

Sediments monitoring
U Exploration Projects
Stakeholders Involvement

Approach areas and some actions:

- **Political**: meetings with national, provincial and local government staff members.

- **Educational**: involvement in educational events and in teachers’ training, constant presence in universities, actions aiming at the inclusion of an objective vision of nuclear issues in the educational syllabus.

- **Social – Institutional**: institutional advertising, participation in community events, meeting with public interest groups, opinion and expectations surveys in areas influenced by mining prospects, improvement of the information available to the public through the Internet.

The main goal is not only to provide information but also to achieve community involvement

Adapted from Luterstein 2008
U Production Project
San Rafael Utility Complex
U Production Project
San Rafael Utility Complex

- San Rafael Utility Complex operated from the middle 70’s to the year 1997, and produced U to feed Argentina’s nuclear reactors.
- Operation has taken place in compliance with environmental, security and radiation protection legal framework and caused a minimal environmental impact limited to the working area.
- Since the last years, different actions aimed at the reopening of the complex have been carried out.

San Rafael Mining Parameters
(Adapted from Castillo 2009)

- Sterile rock exploited: 13.400.000 m³
- Marginal mineral exploited: 376.000 t
- Feeding plant mineral exploited 2.500.000 t
- U Produced: 1,600 t
- Current RAR + IR: 10,010 t U
- Average ore grade: 0.076% U
- Open pit with 0.025% U cut off
In the year 2004 CNEA submitted the EIA “Remediation and Synchronous Restart Operation of San Rafael Mining and Milling Complex with addition of UO$_2$ Production Plant” in order to remediate some legacies and, at the same time, reopen the mine and restart the U production plant.

The Provincial Regulatory Authority stated that CNEA had to begin with the environmental remediation of some legacies (as mine water and solid waste from U concentration process) before the reopening of the U Complex.
U Production Project
San Rafael Utility Complex

• In the year 2006 CNEA submitted the **EIA** “Management of wastes in temporary disposal”. The main goal was to begin with the management of mining waste in order to improve the environmental situation of the site (installation of water and solid wastes treatment plants, construction of new evaporation ponds and U tailings management).

• **Technical and Sectorial Advice** were obtained.

• To improve communication with the community, CNEA carried out many activities:
  - hired an external communication consultant
  - made announcements in mass medias
  - opened an information and visit centre

• Although there were two calls, no Public Hearing took place.

• **Public Hearing and the Environmental Impact Statement** are needed to complete the Environmental Impact Process.
U Production Project
San Rafael Utility Complex

• At the present, CNEA is only allowed to carry out some complementary activities as rebuild evaporation ponds and to make the environmental surveillance of the site.

• It can be pointed out that part of the public opinion might refuse an environmental remediation project that could lead to the future restart of mining and milling activities in the site.
Former Mining and Milling Plants

Sites to be remediated:

1. Malargüe (Mendoza)
2. Córdoba (Córdoba)
3. Los Gigantes (Córdoba)
4. Tonco (Salta)
5. Huemul (Mendoza)
6. Pichiñán (Chubut)
7. Los Colorados (La Rioja)
8. La Estela (San Luis)

Source: PRAMU
CNEA operated Malargüe Industrial Complex at Mendoza Province for 32 years. The Plant produced yellow cake from uranium ores mined from several deposits within the Province.

The production was stopped at the end of 1986 and site restoration was started.

The final objective is to stabilize the tailing system (700,000 t of tailings) for the long term and to minimize the release of pollutants to the lowest levels that could be reasonably achieved.

The last part of the remediation programme will be the reforestation of the area in order to make the sector available for public use, keeping in mind the restrictions and final approval of the Nuclear Regulatory Authority.

Activities performed:
• Dismantling and demolition of existing installation and equipment
• Construction of underground and surface drainage system
• Construction of surveillance camp and laboratories

Activities in progress:
• Tailings containment system composed of an engineered, layered barrier of natural materials

Planned Activities:
• Reforestation of the area
• A 20 year performance monitoring period

Former Mining and Milling Plants
Malargüe Site

Malargüe Former Milling Complex - Mendoza

Tailings containment system – multilayer barrier

Adapted from Kurtz 2008
Former Mining and Milling Plants
Malargüe Site

The public consultation process has been carried out in different development stages of the project.

• In 1994 the Environmental Impact Study and Long Term Management of Uranium Tailings from the Malargüe Milling Complex was submitted to the regulatory authority.

• Two public hearings (1994 and 1996) and a public workshop took place.

• In 1997 the Environmental Impact Statement was given by the regulatory authority.

• In 2001 and in 2005 public opinion surveys and public forums were implemented. Main topics discussed:
  – the project progress
  – the integration process of the U milling tailings as a part of the urban development and landscape
  – the tailings monitoring and surveillance

• In 2006 an information and visit centre was created.
U Mining and Major Public Concerns

- Adverse environmental impact in general (open pits, water, air and soil pollution, fauna and flora detriment).
- Resources’ detriment and depletion (water and energy) “Water is more valuable than gold”
- Negative radiation effects in human health.
- Negative effects of chemicals (as $\text{H}_2\text{SO}_4$) in human health and in the environment.
- Negative impact of mining in traditional economical activities of the community (as tourism and agriculture).
U Mining and Major Public Concerns

- Accidents with radiological and chemical releases.
- Mine’s closure: abandoned radioactive and mining wastes and unemployed workers.
- Former unacceptable mining practices for today’s standards (even no related with U).
- Looting of natural resources
  “They take all away, they do not leave anything”.
- Mistrust in regulatory authorities and mistrust in technical institutions that make the environmental studies (even universities).
Questions from the Public in San Rafael

• Does radiation produce cancer?
• Does radiation affect the wine?
• What do you do with radon?
• The different opinions on the effects of uranium mines, do these depend on the source of information?
• Do you carry out an occupational health monitoring?
• Does CNEA employees have cancer?
• Are children born with malformations?
• Are there any working U mines in Germany?
• If we allow CNEA to open the U mine: Will foreign companies take the U away?
• Are the environmental surveillances made by the universities really independent?
“The fact that we coexist with U and other radioactive materials, does not mean that we are biologically adapted to them. There is no zero risk. Any amount of radiation implies a risk”

Raúl Montenegro, Biologist
(Source: www.uranionogracias.com.ar)

“The public concerns are a matter of risk perception of the population and their willingness to accept the risk”

(Source: Communication Strategies in Uranium Mining. Report of a Consultants meeting held at the IAEA’s Laboratories Seibersdorf, Austria, 15-19 October 2007)
Final Remarks

• In Argentina U mining and milling have always taken place in compliance with the safety, environmental and radiation protection national framework. These activities have caused a minimal impact limited to the working area and there were no harmful effects within local communities.

• In spite of this, part of the population still remains insecure.

• When facing opposition of some NGOs, it must be taken into account that not necessary all the community shares the same opinion. Moreover, many people ignore CNEA's activities, including the environmental protection actions that are taken.
Final Remarks

• When there is a lack of accurate and consistent information available to the public, and it is easier to find libelous or inaccurate information about U mining, laypersons become into opponents of the project, just in case.

• Many people who are against a U project, not only do they think about the specific results of the project, but they also think about other potential collateral consequences, for example:

“If remediation of a part of the legacies is allowed, the mine will be reopened; if the reopening of the mine is allowed, foreign companies will come to the country, will open other mines and will take away all the natural resources at very low costs, and local communities will carry the burden from the effects of mining (legacy sites and diseases)”.
Final Remarks

- Stakeholders have the right to be informed and to be involved in decisions that may affect their well-being.
- Reasonable issues and concerns that are presented by stakeholders should turn into decisions to improve the benefits of the initial project.
- Timely stakeholders’ involvement may encourage public confidence, which is an important prerequisite for the project’s success.
- Stakeholders’ involvement may be a major administrative and logistical challenge, but it must be taken into account that all technical work might be lost without commitment and fluent communication with population and regulators.
References

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