



ARGENTINE SITUATION

**COMISIÓN NACIONAL DE ENERGÍA
ATÓMICA
ARGENTINA**



**Vienna
June 2009**



INTRODUCTION



NUCLEAR ACTIVITIES IN ARGENTINA

Vienna, June 2009

REPÚBLICA ARGENTINA



-  NUCLEAR POWER PLANTS
-  RESEARCH REACTORS
-  PARTICLES ACCELERATOR
-  RESEARCH ATOMIC CENTER
-  HEAVY WATER PRODUCTION
-  IRRADIATION UNITS
-  URANIUM MINES
-  URANIUM PURIFICATION
-  INDUSTRIAL APPLICATIONS
-  NUCLEAR MEDICINE



NUCLEAR POWER PLANTS



ATUCHA: 360 MW HWPR Siemens prototype start up 1974

EMBALSE: 630 MW CANDU type start up: 1983

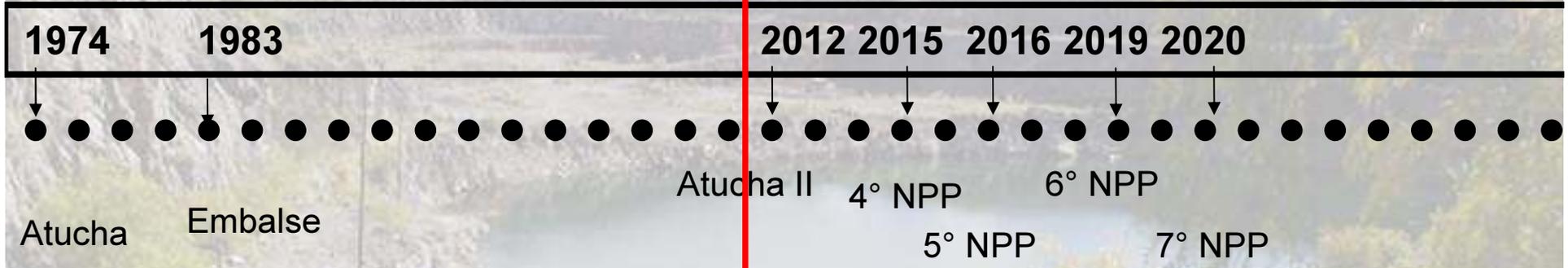
ATUCHA II: 630 MW HWPR Siemens Type, in construction start up 2011



NPP'S LONG TERM PLAN

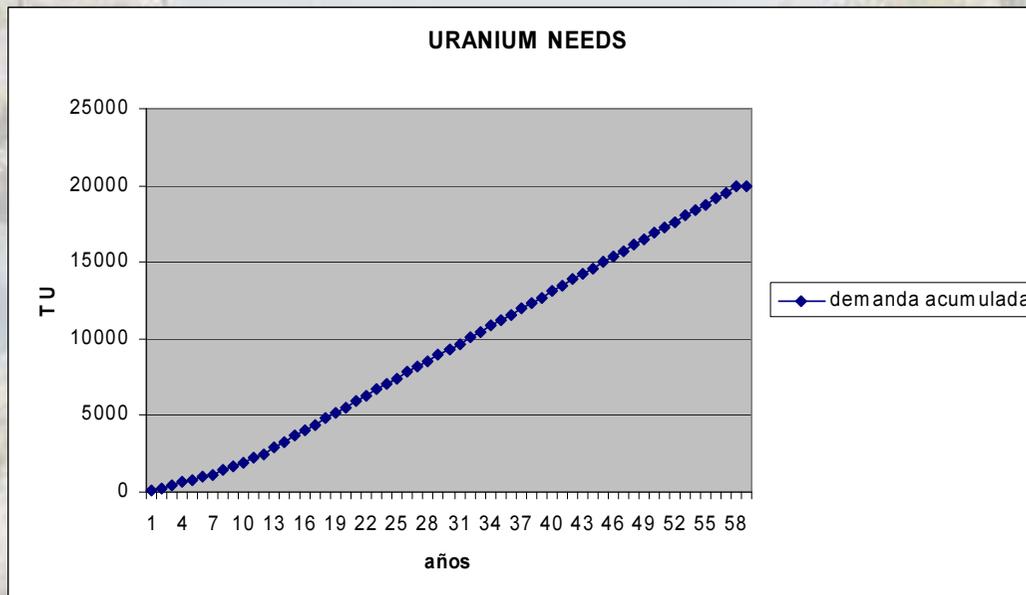
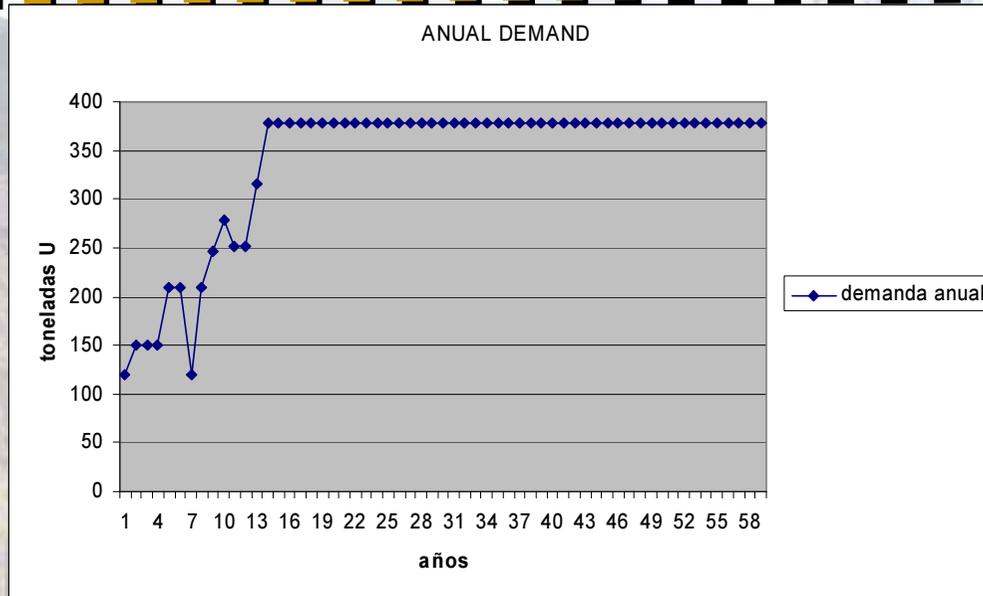


Start up NPP





LONG TERM URANIUM DEMAND





FEDERAL MINING LAW

NUCLEAR MINERALS

Art. 205. – The nuclear minerals are regulated for this law as first and second class mine. Atomic Energy Commission (CNEA) is in charge of supervise and to advise to provinces about uranium exploration and production.

Art. 206. – Uranium and Thorium are nuclear minerals

Art. 207. – The companies that explore nuclear mines need to elaborate an EIA before any action. Is forbidden to sell or export nuclear product without CNEA and Government authorization.

Art. 208. – The owners of mines with nuclear minerals are demanded to inform the reserves and production of this

Art. 209. – CNEA will have the first option to sell the nuclear minerals

Art. 210. – The exportation of nuclear minerals and derivatives need the CNEA approval who will guarantee the internal provision and final destination of the exported minerals

Art. 211. – CNEA can prospect, to explore and to produce concentrates of nuclear materials according with this law. CNEA will decide to exploit or maintain in reserve the following mines: Doctor Baulies/, Los Reyunos/ (Mendoza Province) and Cerro Solo/ (Chubut Province).



ACTUAL RESERVES

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ARGENTINE URANIUM RESOURCES .



DEPOSIT	Category	Indicated R.R.A.			inferred I R.A.E.I.			TOTAL
	U\$/Kg U	< 40	< 80	< 130	< 40	< 80	< 130	
Sierra Pintada		2140	2140	3900	480	1800	6.110	10010
Cerro Solo		2890	2890	3330	2200	2550	2620	5950
Laguna Colorada		100	100	100				100
Total		5030	5130	7330	2680	4350	8730	16060

C.N.E.A.
RESERVAS
 URANIFERAS
 LIC. P.SARDIN
 ABRIL 2009.



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Exploration plan and new policies of reactivation

R. E. BIANCHI

Exploration Raw Materials Manager, CNEA

In Argentina known U resources are related to sedimentary, igneous and metamorphic environments.

Considering the geology of the different regions, Argentina has been divided into 57 units in which the geological, geochemical, mineralogical and structural information is evaluated in order to estimate the uranium geological favorability of each unit.

The final pursuit of this regional study is to circumscribe new areas with anomalous uranium contents in which prospection and exploration should be carried out.

These studies together with prospection and exploration works are performed in the country by four exploration centers based in Salta (RN), Cordoba (R.Ce), Mendoza (R.Cu) and Trelew (RP).



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The works planned for each exploration center includes:

- Regional Noroeste**, Mina Franca Deposit: peri-granitic vein- type mineralization: 25% of surface exploration has been performed. Mineralized areas: Istataco and San Buenaventura correspond to an igneous-metamorphic environment, Sierra de Vaquería to a sedimentary one: Prospection stage.
- Regional Centro**, Mineralized areas: El Gallo: drilling stage and Donato: prospection stage, correspond to an igneous-metamorphic environment with intra and peri-granitic anomalies. Noya: prospection stage, sedimentary environment.
- Regional Cuyo**, Mineralized area: Western Sierra Pintada: prospection stage, volcano-sedimentary environment. Neuquina Basin area: prospection stage. Uranium anomalies hosted by sedimentary deposits. This area is being tested for the application of in-situ leaching techniques (LIS).
- Regional Patagonia**, East Pichiñán uranium District: it includes the Cerro Solo, El Ganso, Puesto Alvear, El Molino and Arroyo Perdido deposits hosted by sedimentary rocks. Exploration drilling and reserve evaluation are currently being developed in Cerro Solo, whereas exploration drilling is carried out in the other deposits. Laguna Colorada deposit: Corresponds to a volcano-sedimentary environment: an exploration-drilling program has been planned for this area. Mineralized areas Mirasol Norte, El Cruce, El Picahueso, La Salteada, El Curioso, Meseta Cuadrada, Sierra Cuadrada Norte and Sierra Cuadrada Sur, hosted by sedimentary rocks and Cerro Chivo, hosted by volcano-sedimentary rocks. Different stages of surface exploration are being performed in these areas Mineralized areas Laguna Sirven and Primavera, calcrete-type of mineralization, are being explored by means of trenches.



SIERRA PINTADA SPECIFIC CASE



OVERVIEW

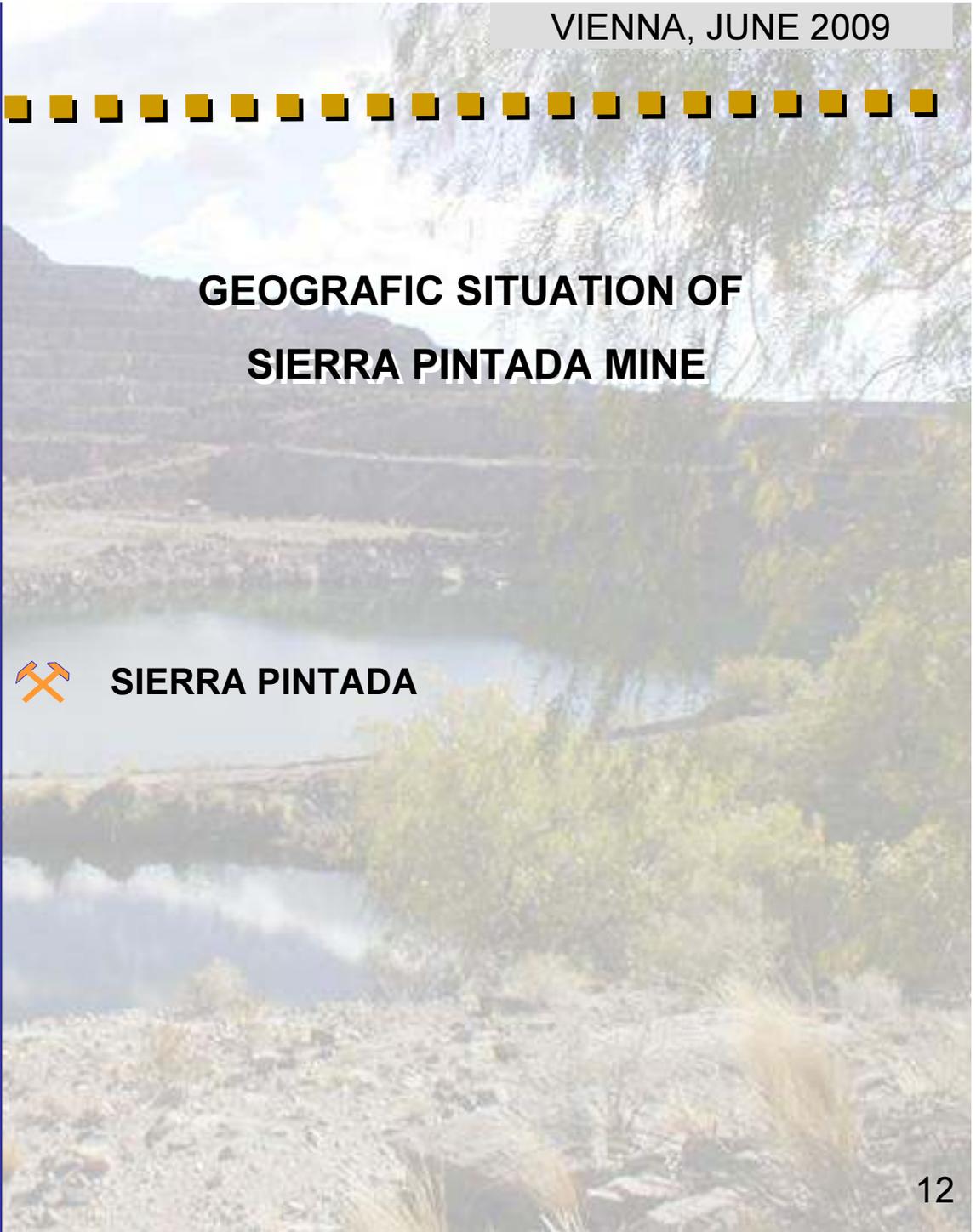
REPÚBLICA ARGENTINA



GEOGRAFIC SITUATION OF SIERRA PINTADA MINE



SIERRA PINTADA







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COMPLEJO MINERO FABRIL SAN RAFAEL





SIERRA PINTADA SPECIFIC CASE



MINERALOGY

Quartz, Feldspar, Calcite, and Kaolinite are the most abundant minerals in the ore. The rock is formed by moderately well-sorted grains of quartz, feldspar, and rock fragments, all cemented by calcite with minor clay replacement.

This mineral is a sandstone with high quantity of carbonates.

Uraninite, Brannerite and Coffinite were the only primary uranium minerals that have been clearly Spotted.

Uranophane and Liebigite were the secondary uranium minerals found



SIERRA PINTADA SPECIFIC CASE

Mining parameter

**Open pit with 0,025%U cut off.
6500tU reserves.**

Sterile-mineral rate: 10/1.

Average uranium contain: 0,076%.

Sterile benches high: 10m.

Mineral benches high: 2,5m.

By now we have exploited:

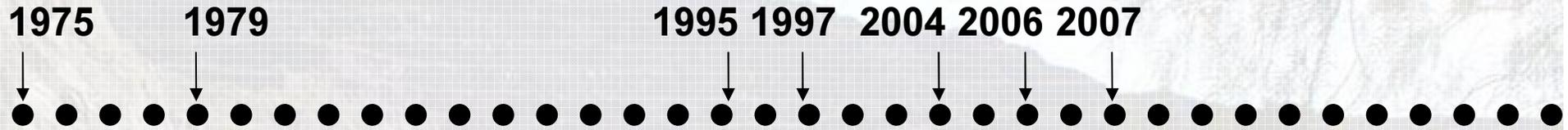
13.400.000 m³ of sterile rock.

376.000t marginal mineral.

2.500.000t feeding plant mineral.



IMPORTANT NODS OF CMFSR

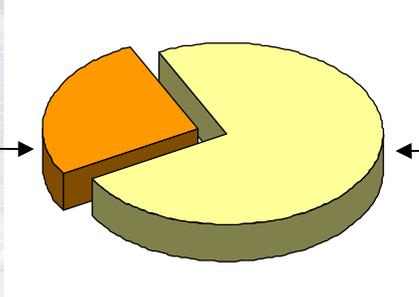


MINE OPERATION

PRODUCTION

EIA MGIA L772

PRODUCED: 1.600 t U



LEFT TO EXTRACT: 6.400 t U

14 PREVIOUS ENVIRONMENTAL STUDIES

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AÑO	DESCRIPCION	AUTORIA
1985	Research about Ra 226 and natural U migration from CMFSR toward the environment	CNEA: Contract O.I.E.A. – C.N.E.A. N° 3123/RB (OIEA TEC-DOC 370)
1987	Mendoza Law 5330 Agreement between CNEA- MZA government	Mendoza-CNEA
1992	Recovering of antecedents and bases for effluent treatment in CMFSR	CNEA
1994	Pre-study of EIA for CMFSR	DBE Technology GmbH - Dr. Enrique Biurrun – R. F. de Alemania
1997	EIA	CNEA-CMFSR
1998	Resolution N° 1826/AOP/1998 entrance of 1.538 drums of wastes inside the project “treatment waste type RS y RTD”	Ministerio de Ambiente y Obras Públicas de la provincia de Mendoza
1999	Paper N° 46992 y 41730-SD y 222284 of DGI – Technical opinion about to pour mining water to Arroyo El Tigre.	Master in Environmental Engineering of Cuyo University
2001	Report about Environmental wastes produced by CMFSR activities	CNEA-CMFSR
2002	EIA for CMFSR	DBE Technology GmbH - Dr. Enrique Biurrun – R. F. de Alemania
2003	INF-IP-120-03. treatment and management of solid wastes	CNEA
2003	Advise of Proyect: Management of accumulated mining water	CNEA
2003	Report about priorities in waste management.	CNEA-CMFSR
2004	“EIA: Remediation and synchronic restart operation of CMFSR with aditon of UO2 Production plant	UTN - Regional Avellaneda – Chemical Engineering Department
2006	MGIA: TREATMENT OF SOLID WASTE AND WATER OF THE MINE	CNEA



After that, Mendoza Authorities ask for:



Technical opinion

- University of Mendoza, Engineering branch

Reports to:

- Mayor of San Rafael
- Water Authority in Mendoza Province
- Mining Direction
- Nuclear Regulatory Authority

All of them aproved the CNEA´s EIA



Normal following step:

- **Public Audience**, here the people can ask to CNEA about the remediation program.
- What was the reality?

One NGO present to the Justice one

PRECAUTIONARY MEASURE

(is forbidden to do any rock movement)

process which secure to the plaintiff against loss irreparable injuries while the action is pending

Why?, because they say that we must to remediate all the place (TO CLOSE THE MINE)



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ACTUAL SITUATION

- We are only allowed to take care of the place and rebuild some waste dumps to recover water from the rain and the pits

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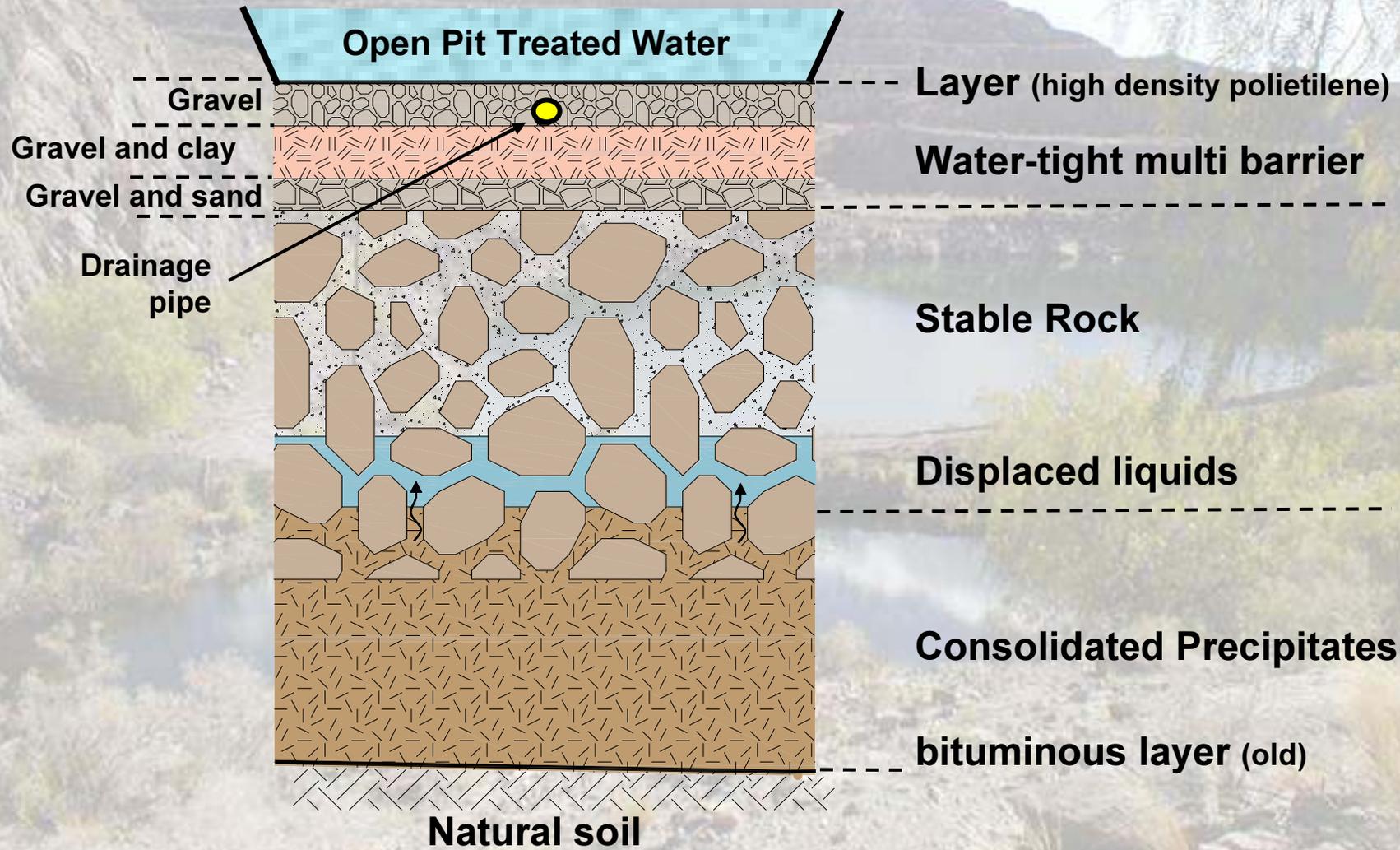


Former situation of waste dumps





PROJECT OF THE DUMPS BOTTOM





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Actual state of waste dumps





Consequence:

- **THERE IS NO RISK FOR HEALTH POPULATION**
- **CNEA and environmental organizations always controlled the CMFSR**
- **There is a very low environmental impact inside the production zone**
- **All the wastes are qualified and stored in safe format**
- **CNEA always follow the rules of Mendoza province**



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FINALLY

To complete the environmental situation, two years ago was approved the:

MENDOZA LAW N° 7722.

Article N°1: ~ to effect of guarantee the natural resources specially the water, is forbidden the use of chemicals us cyanide, mercury, sulfuric acid and other similar toxics in metal mining process of searching, prospection, exploration, and industrialization of minerals extracted by any methods.

Other articles are complementary.....



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AND NOW???

- **In 2006 the Federal Government announce full support to Pacific Nuclear Activities in Argentina.**
- **This include: uranium exploration and production, uranium enrichment and NPP'S construction.**



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- The local government try not to put in risk the agriculturists VOTES and do not define if will permit the mine operation in the future.
- The Federal Government say that do not go on with the remediation of the mine meanwhile the Province maintain the position.
- **WE ARE WAYTING.....**



CERRO SOLO SPECIFIC CASE



- This is the second mine in Argentina
- Situated in the south of the Country (Chubut Province)
- There was explored, evaluated and made the feasibility study.
- Now we are ready to begin the mine production and mill construction.
- There is no problem with the Critical population
- But there is a LOCAL law



Law N° 5.001/03

Article N°1: ~ is forbidden the metal mining in all the Chubut province as an open pit and the use of cyanide

Article N°2: in 120 days, the province will be divided in zones to permit different types of mining in different zones.....

Other articles are complementary.....

April 09 of 2003

The province is not divided yet



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About the following steps in the fuel cycle

- **DIOXITEK:**

company of CNEA and Mendoza province is in charge of uranium purification and UO₂ conversion.



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CONUAR

(PRIVATE company with CNEA participation) is in charge of make the pellets and assemble the fuels to Atucha and Embalse.

In the case of Atucha this company mix uranium to obtain LEU (0.8%) that use this NPP.

Embalse use only natural uranium.



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NASA

Nucleoeléctric**A** **S**ociedad **A**nónima

Government company that is in
charge of NPP's operation



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**Thanks
for
your
attention**

