Conservación, mantenimiento y acondicionamiento para la puesta en marcha de PIAP

Conservation, maintenance, and conditioning for the start-up of PIAP

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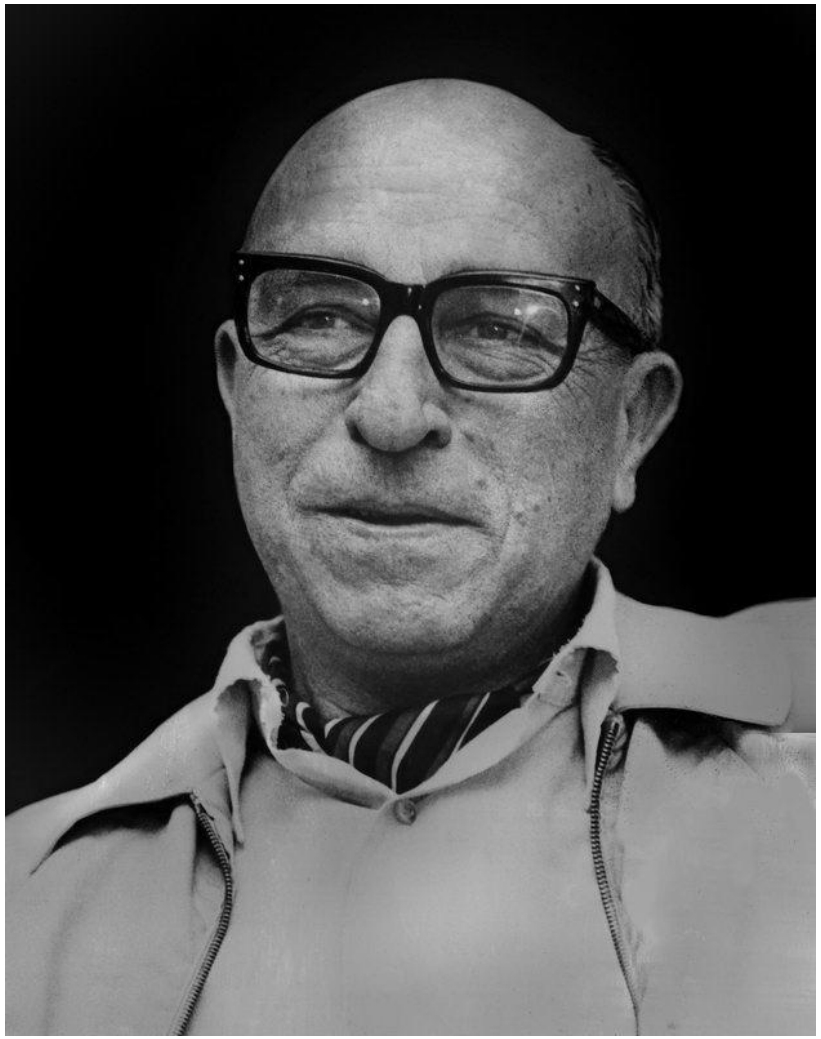
Comisión Nacional de Energía Atómica

AATN 2022

Soberanía energética, autonomía tecnológica e industria nacional

Energy sovereignty, technological autonomy, and national industry

Since 1950 the **National Atomic Energy Commission (CNEA)** is the main public organization devoted to Research, Development, Production and Applications in the peaceful uses of nuclear energy.



Jorge Sabato

Estudio de Campo CNEA

Field Study

Febrero 2023

February 2023

Ing. José Luis APREA

Visita Técnica CNEA - NASA
Technical Visit

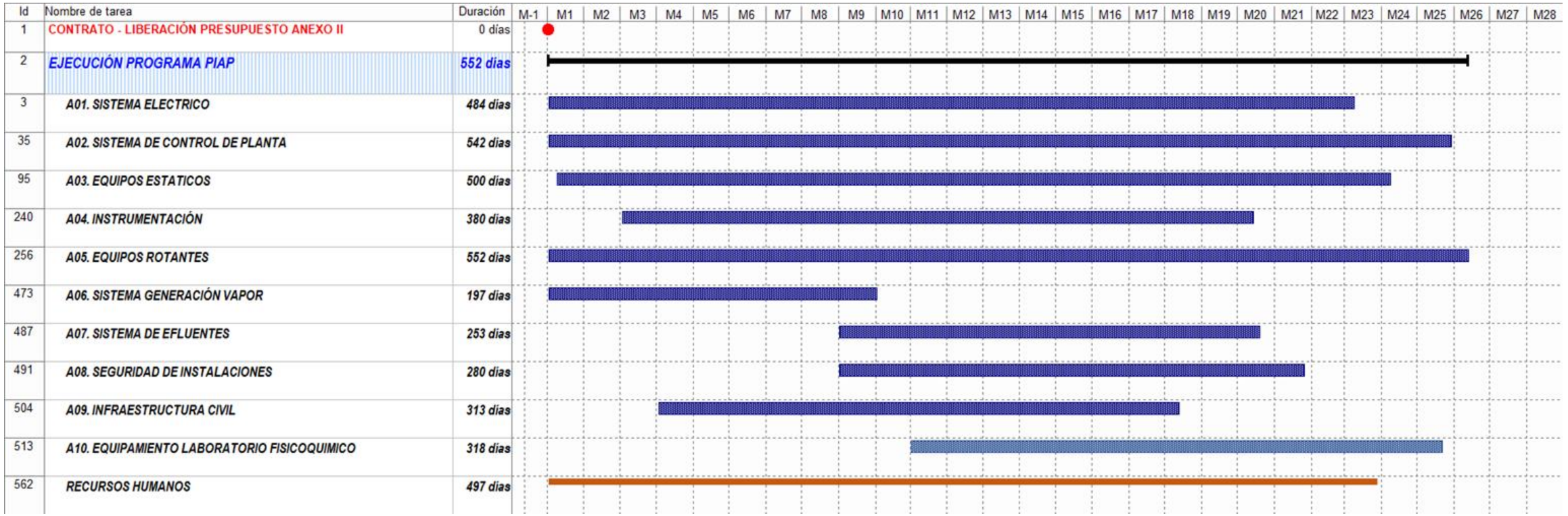
Marzo 2023 - March 2023

- Química y procesos
- Equipos Rotantes y Vibraciones
- Sistema Eléctrico
- Instrumentación y Control
- Corrosión
- Hidrógeno en materiales

Recommissioning project

On May 12, 2023, a two-year **recommissioning project** began.

25 month recommissioning contract



Id	Nombre de tarea	Duración
1	CONTRATO - LIBERACIÓN PRESUPUESTO ANEXO II	0 días
2	*EJECUCIÓN PROGRAMA PIAP*	*552 días*
3	*A01. SISTEMA ELECTRICO*	*484 días*
35	*A02. SISTEMA DE CONTROL DE PLANTA*	*542 días*
95	*A03. EQUIPOS ESTATICOS*	*500 días*
240	*A04. INSTRUMENTACIÓN*	*380 días*
256	*A05. EQUIPOS ROTANTES*	*552 días*
473	*A06. SISTEMA GENERACIÓN VAPOR*	*197 días*
487	*A07. SISTEMA DE EFLUENTES*	*253 días*
491	*A08. SEGURIDAD DE INSTALACIONES*	*280 días*
504	*A09. INFRAESTRUCTURA CIVIL*	*313 días*
513	*A10. EQUIPAMIENTO LABORATORIO FISICOQUIMICO*	*318 días*
562	*RECURSOS HUMANOS*	*497 días*

Heavy water and natural uranium

In the early 1960's, Argentina chose to construct **PHWR** considering **technological autonomy**.

- Uranium from argentinean mines
- U3O8 pellets and nuclear fuel bundle fabricated locally
- **HW was production required to complete nuclear fuel cycle**

HW in Argentina

First approaches (1950-1955):

- Stable Isotopes Laboratory designs a distillation column to obtain HW from natural water.
- Study of the isotopic exchange of deuterium between hydrogen and water vapor.
- The catalytic activity of platinum and aluminum.

30 years later...

3 Heavy Water Projects

2 technologies for HW production:

- Sulfide (PEAP and M80)
- NH3- H2

In 1979 CNEA decided to buy an industrial plant from Sulzer Brothers

- 200 tn/year to accomplish production for at least 6 NPPs according to 1979 Nuclear Plan.
- Production by the **NH3-H2 exchange process.**

Heavy Water Industrial Plant (PIAP)

Contract signed between Sulzer Brothers Limited and CNEA in march 1980

The plant opened in march 1993

The design was made with Sulzer and CNEA's engineers support

CNEA - Associated Companies

1976	1982	1989	1994	1997
INVAP S.E. Multi-purpose Reactors, Engineering, and Services	Combustibles Nucleares Argentinos S.A. Nuclear Fuel Nuclear Components	Empresa Neuquina de Servicios de Ingeniería S.E. Heavy Water Production	Nucleoeléctrica Argentina S.A. National Utility	Dioxitek S.A. Uranium Dioxide & Co-60

Ownership and Operation

CNEA: PIAP's owner

National Atomic Energy Commission

ENSI (national utility)

51% Neuquén Province

49% CNEA

PIAP is located at Neuquén province

PIAP Production capacity

- 2 lines of 100 tn/y (max.) **reactor grade HW (> 99.88 % molar).**
- With 3 national NPPs PIAP operated mostly with 1 line at a time
- In 1998 PIAP produced 200tn, according to design capacity, with 400 workers.

HW production for local supply and export

Local production:

- **9-09-1994** first day of HW production
- Production to return Canada's HW from Embalse NPP: **600 tn**
- 2nd production for Atucha II NPP: **689 tn**
- HW replenishment for argentinean NPPs

>1400 tn total

Exports:

- USA research
- South Korea replenishment of NPPs
- France, Germa

Fitness for service (2017)

The plant performed a Fitness for Service in 2017, after producing **600 tn of HW** for Atucha II NPP.

Production interruption

Production was interrupted in 2017 and **PIAP was kept under maintenance conditions**.

Expected production

One line for **80 tn/y** average production

Comissioning

The commissioning of the plant is expected to start in **2025**

Duration: **4 - 6 months** to provide reactor grade HW

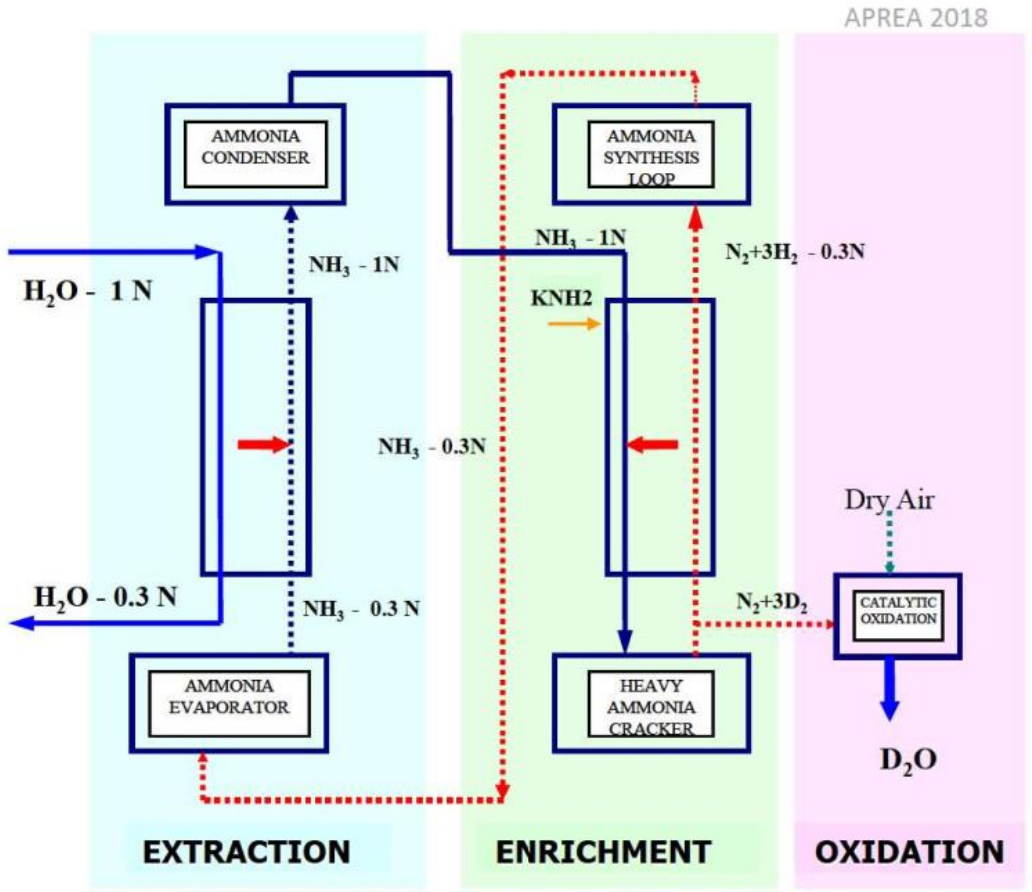
2 production lines

The most important components and systems shared with the 2 lines are contemplated to be conditioned in this project.

There's an **opportunity** to recommission the 2nd line, bringing PIAP into a 200 tn/y production plan.

Simplified process diagram

Heavy water by **monothermic isotopic exchange process between ammonia and hydrogen** (NH_3/H_2) for the 3 argentinian NPPs



Muchas gracias!

Thank you!