



APPROPRIATE MERCURY-FREE GOLD PROCESSING TECHNOLOGY FOR ASGM

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THE DIRECTOR OF THE CENTER FOR MINERAL DEVELOPMENT TECHNOLOGY'S PERSONAL DETAILS:

NAME : Dr. Ir. Rudi Nugroho, M.Eng

DATE OF BIRTH : February 16, 1968

SPECIALIZATION : Chemical Engineer (Process Engineering)

JOIN BPPT : December 1993

Dr. Ir. Rudi Nugroho, M.Eng attained his master's degree (in 2000) and doctor's degree (in 2003) after graduating from OITA University.

On January 2016, was appointed as Director of the Center for Environmental Technology until on September 2019 was inaugurated as Director of the Center for Mineral Resources Development.

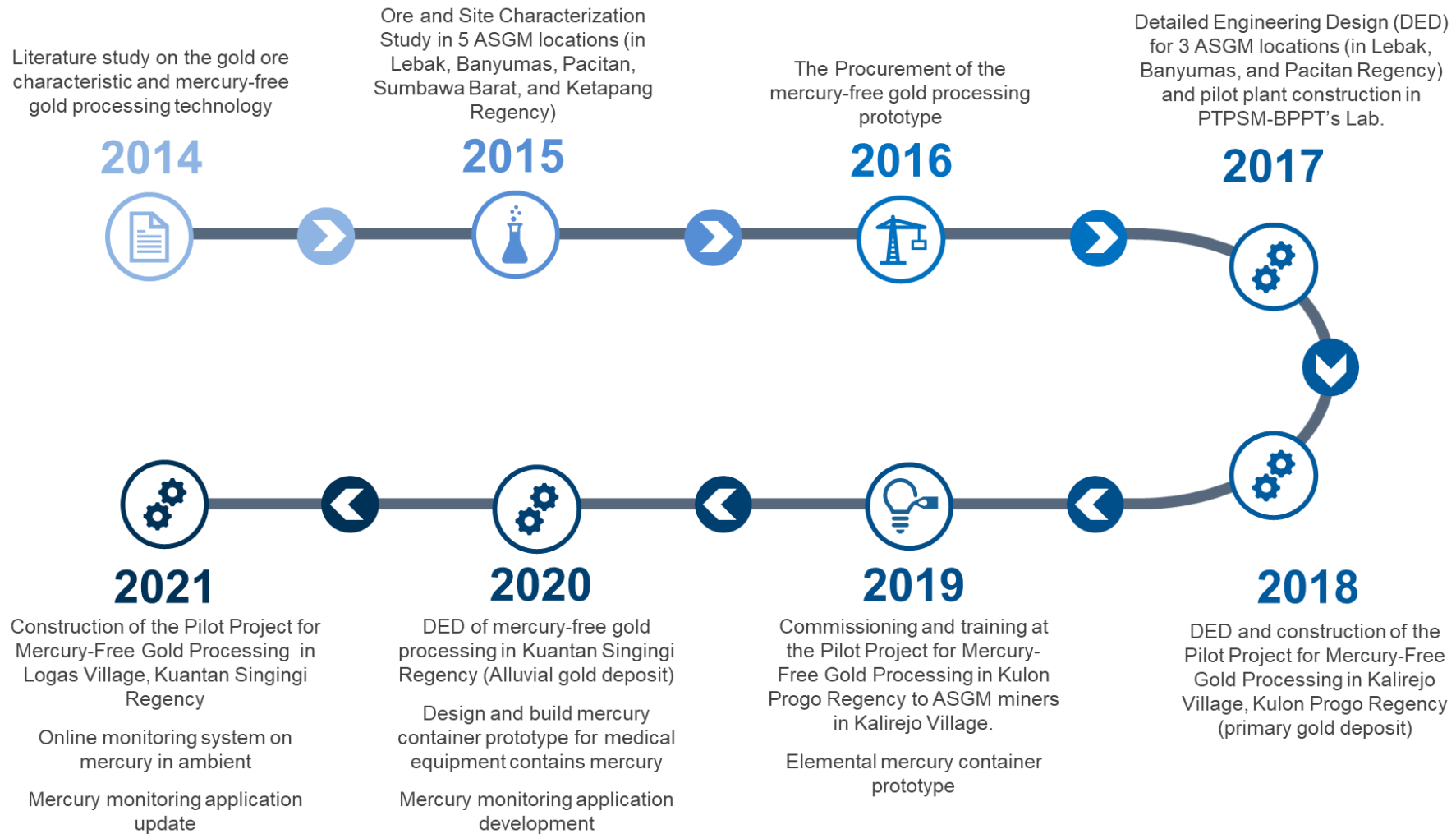


BADAN PENGKAJIAN DAN PENERAPAN TEKNOLOGI (BPPT – THE AGENCY FOR THE ASSESSMENT AND APPLICATION OF TECHNOLOGY)

BPPT is a non-ministerial government agency under the coordination of the Ministry of Research and Technology of Republic Indonesia.

BPPT has the tasks of carrying out government duties in the field of assessment and application of technology, including the assessment and application of mercury-free gold processing technology for Artisanal and Small-scale Gold Mining (ASGM).

THE TIMELINE

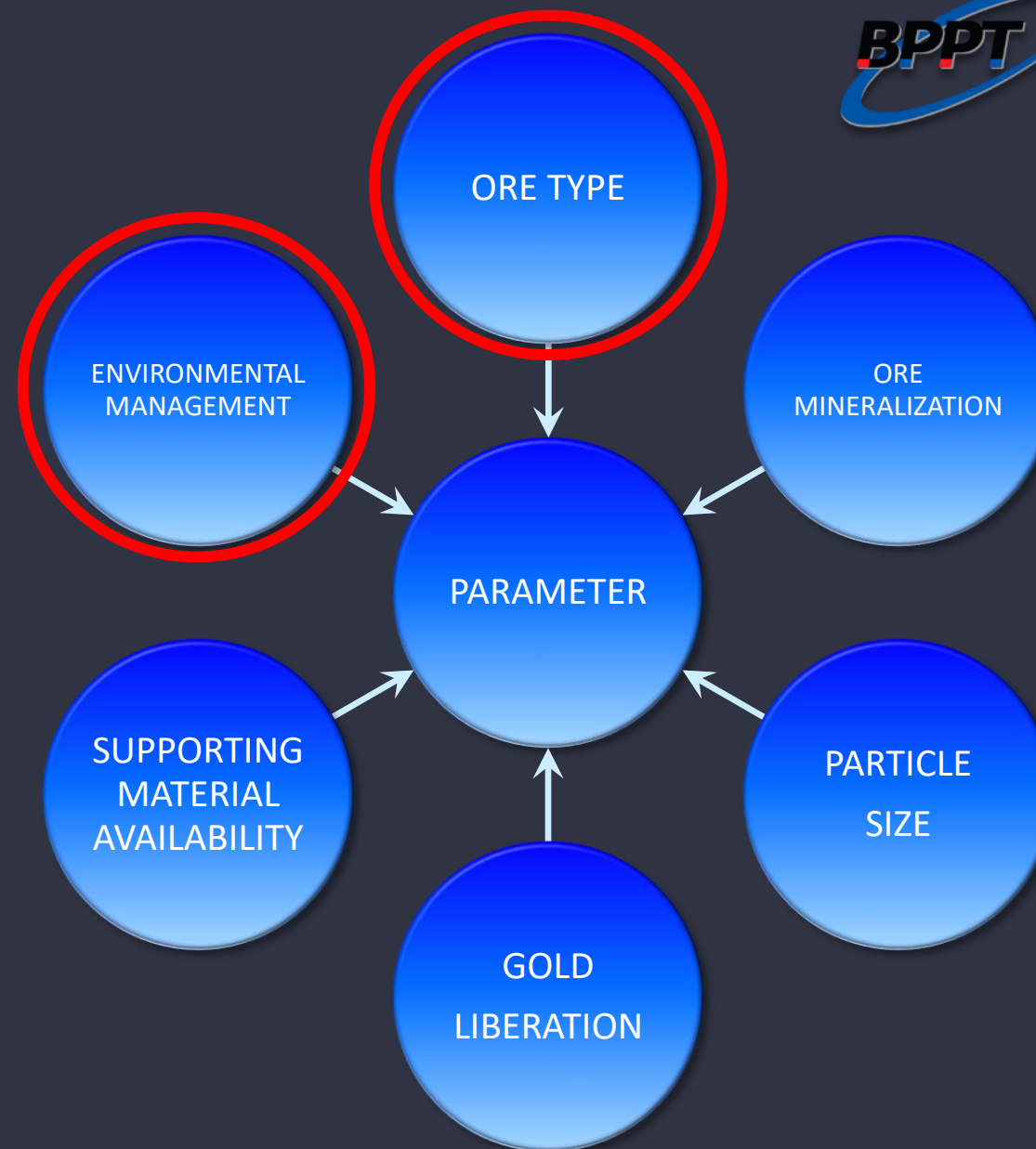


GOLD PROCESSING TECHNOLOGY SELECTION

It is IMPORTANT to have a comprehensive understanding on the gold ore characteristic.

Appropriate gold processing technology for ASGM shall meet the following criteria:

- Low capital
- Low operation and maintenance cost
- Simple process and low duration time
- High recovery
- Controllable tailing and environmental sound waste management.



THE ASSESSMENT AND APPLICATION OF TECHNOLOGY WORKFLOW



Ore and site
characterization



Feasibility
study



Construction



Training



Metallurgical
test



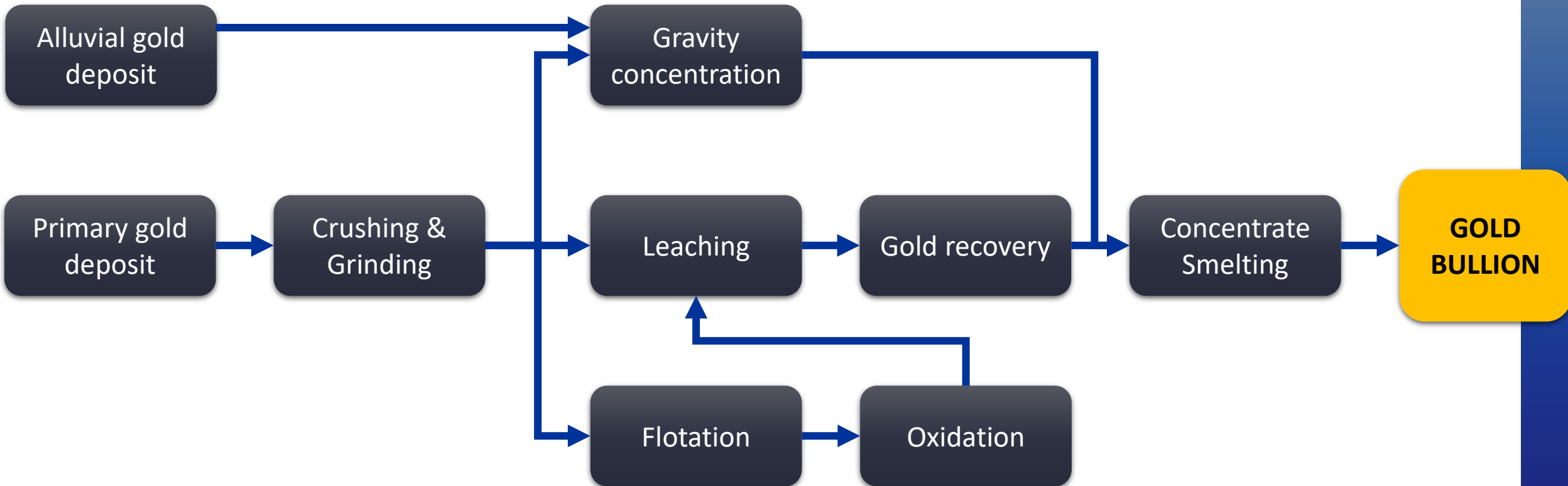
Detailed
Engineering
Design (DED)



Commissioning
and
optimization



MERCURY-FREE GOLD PROCESSING TECHNOLOGIES



SODIUM CYANIDE

- **COMMON:** Most of the gold mining industries have been used this chemical for decades on their gold processing facilities. This leaching agent is more preferable due to its high gold recovery (up to and more than 90%).
- **MANAGEBLE:** within appropriate pH controlling, $\text{HCN}_{(g)}$ generation will significantly low. In addition, excess free cyanide in the tailing is removeable within chemical and/or biological oxidation, and/or natural attenuation.
- **ACCESSABLE:** processing and recovery material and equipment easily find and/or fabricated in Indonesia.



THIOSULFATE



- **High chemical (thiosulfate) consumption.**
- **UNSTABLE:** This agent require ammonium hydroxide that tends to transform into NH_3 gas (corrosive) resulting in the instability of the gold leaching reaction.
- **UNCOMMON:** Require uncommon resin for gold recovery.

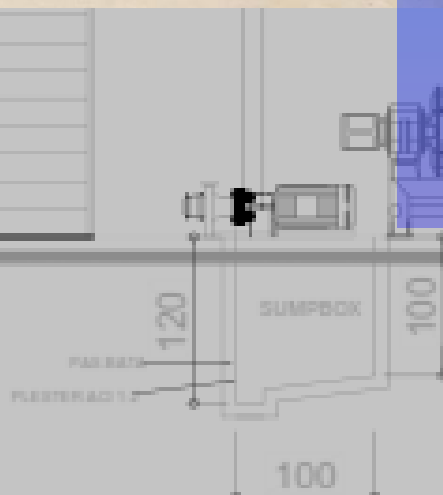
THIOUREA

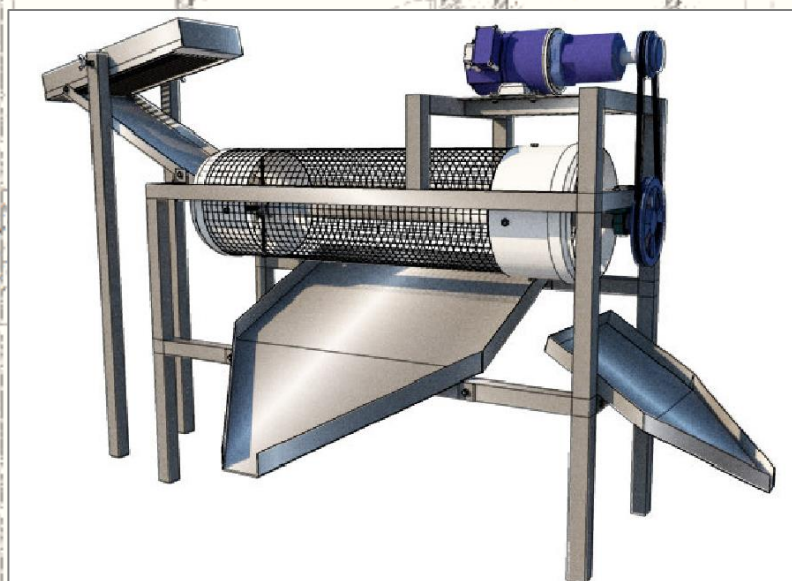
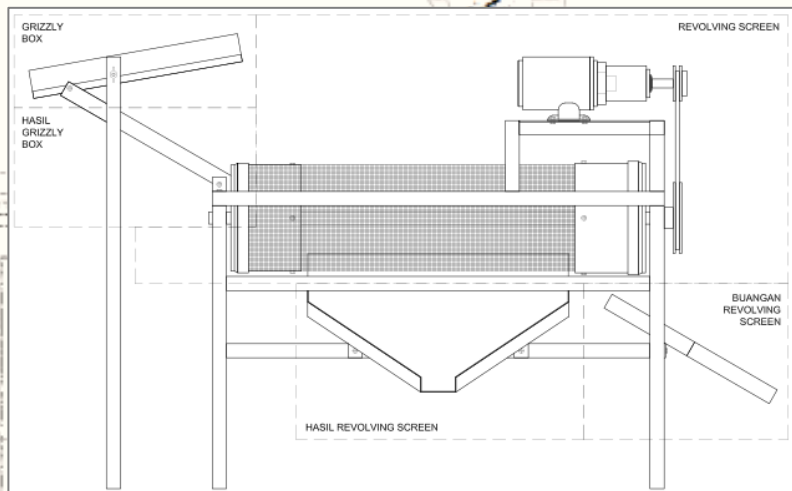
- **Low environmental impact.**
- **UNCOMMON** due to high chemical consumption (10% from total ore mass), more expensive than cyanide, and limited research on gold processing within thiourea.
- **High acid consumption.** Typical pH process < 2 .



**DED MERCURY-FREE GOLD
(PRIMARY GOLD DEPOSIT)
PROCESSING IN 4
REGENCIES WERE
DEVELOPED**

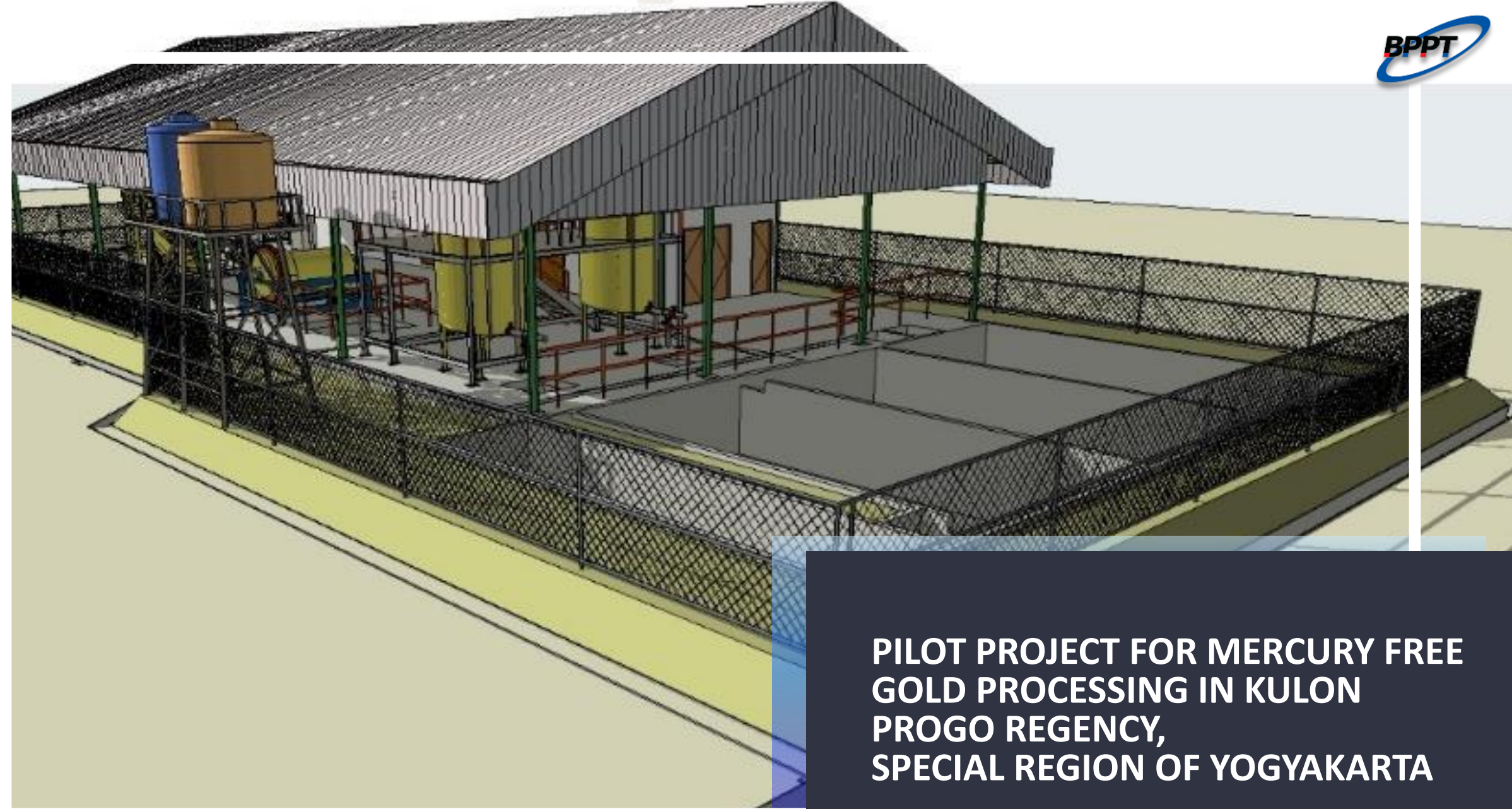
**LEBAK, BANYUMAS, PACITAN,
& KULON PROGO**





DED MERCURY-FREE GOLD (ALLUVIAL GOLD DEPOSIT) PROCESSING IN 1 REGENCY WERE DEVELOPED

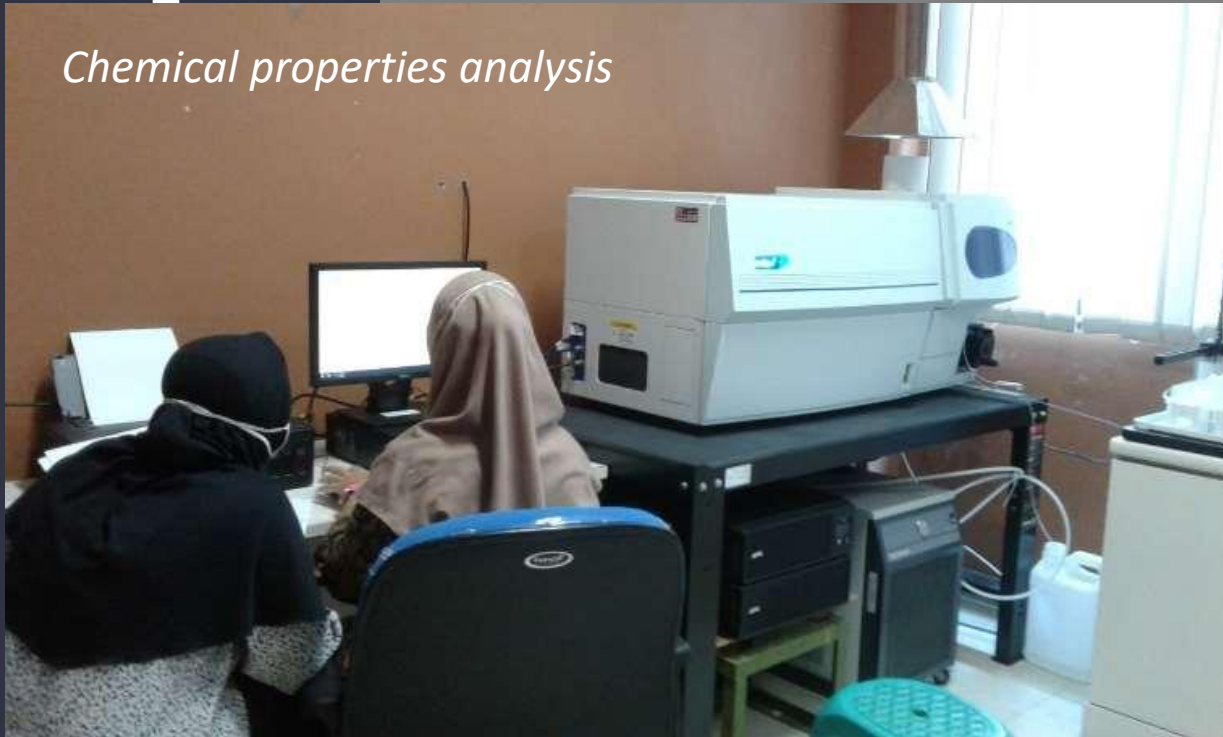
KUANTAN SINGINGI



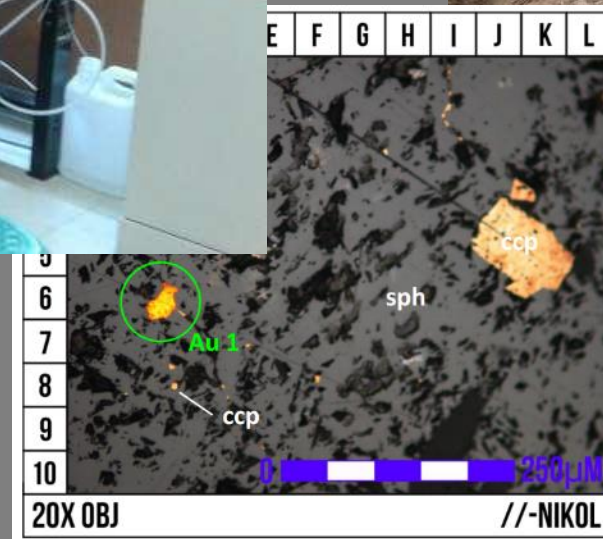
**PILOT PROJECT FOR MERCURY FREE
GOLD PROCESSING IN KULON
PROGO REGENCY,
SPECIAL REGION OF YOGYAKARTA**

ORE & SITE CHARACTERIZATION

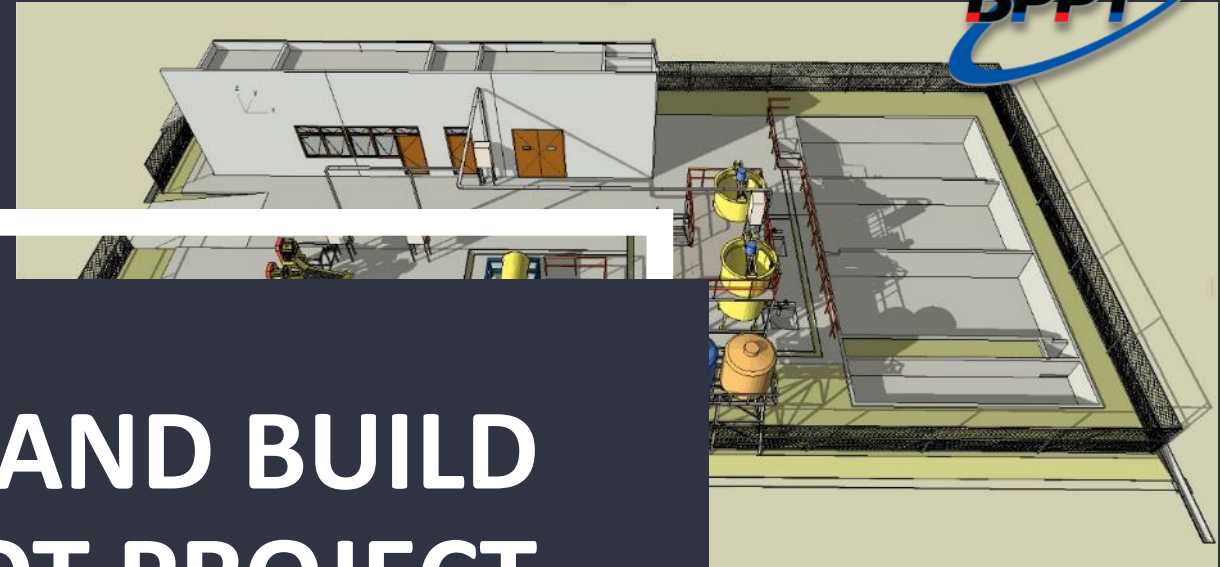
Chemical properties analysis



Field survey & sampling



Physical properties analysis



DESIGN AND BUILD THE PILOT PROJECT



COMMISSIONING, OPTIMALIZING AND TRAINING

On February 2020 (just before Covid-19 spreading out in Indonesia), BPPT, within GOLD ISMIA Project support, conducted the first mercury-free gold processing training for Kalirejo's ASGM in our pilot project in Kalirejo Village, Kokap Sub-district, Kulon Progo Regency, Special Region of Yogyakarta.

20 Trainers of trainer from 3 gold mining cooperatives attained Good Mining Practices Training and Mercury-free Gold Processing Simulation including the waste treatment as well. The simulation produced for over than 331 gr of gold bullion (contains gold and silver).





TERIMA KASIH (THANK YOU)