Recent achievements of IRE’s LEU conversion project
IRE, a world leader

- Major producer of fission $^{131}\text{I}$
- Major producer of $^{99}\text{Mo}$
  - 3 productions/week ; 365 days/year
  - 50% of European needs,
  - 175 employees
  - Exportation
    - Europe
    - USA
    - Asia
    - Middle east
  - Other Isotopes: Y-90, Re-188, ...
• Increase overall process safety
• Reduction of gaseous releases
• Production capacity: 3500Ci/week – 6d calibration
• No interruption of HEU process
• Stress test results compliance

First commercial LEU production
July 2016
Target specifications

- Innovative target
- 1 Target design
- Manufacturing validation
- Full qualification in 5 European reactors

- At least maintain the $^{235}\text{U}$ content
- Increase the uranium loading
- Al alloy cladding

Fits all reactors

Reliable supply of $^{99}\text{Mo}$
LEU target qualification in BR2

- Completed!
- All tests are successful YTD.
- Awaiting formal approval from safety authority

Courtesy SCK-CEN
Conversion plan for reactors

- HFR (Petten) 
- BR2 (Mol) 
- MARIA (Swierk-Warsaw) 
- LWR-15 (Rez-Praha) 
- FRM-II (Munich) 
- JHR (Cadarache) 
- Osirix (Saclay)
Transport container

- Modifications of inner parts to fit plates
- Coupled with the five-years container assessment
- Modifications of the overpack

- New transport license have been obtained!
Transport container
Hot cell refurbishment

• Hot refurbishment completed!

• Dedicated hot cell for the process upstream
  • Dissolution
  • $^{99}$Mo-$^{131}$I separation step

• Guaranty of the security supply
Hot cell refurbishment

Decontamination work
Hot cell refurbishment

According to stress test results
Hot cell refurbishment: waste tank
Hot cell refurbishment

- Air flow, pressure and humidity
- Radiological monitoring
- Hot cell operations: door lock, power, in-process controls
Process modifications

LEU conversion impacts

- Target design
- Target specifications
- Dissolution
- U filtration
- $^{99}$Mo - $^{131}$I separation step
- $^{99}$Mo purification
- $^{131}$I purification

Improved safety
Process off-gas management

- Passive system
Example impact of the conversion

- Modification of the process equipment

- Volume ↗

- New targets introduction

- Compliant with new P condition
Cold commissioning

- On going: several successful runs have been performed
- Increase progressively the batch size
- Processing on Al plates and non-irradiated uranium targets
- Spike with limited amount of activity

- Develop new Standard Operating Procedures
- Perform operator training
  - New production environment
  - Process
Hot commissioning

- **Ramp-up**
  - Increase progressively the batch size
  - Processing of irradiated targets to full scale

- **Validation**
  - Full scale runs
  - Record stability data and perform extensive QC
  - Regulatory file modifications

- **Obtain GMP certificates and validation by customers**
Conclusions

• Project running full steam ahead and on time
• Several major milestones have been achieved
• Cold commissioning of the process has started
• Possible conflicts with HEU productions during hot commissioning and process validation (S1-2016)

But no compromise on the security of supply
Excellence dedicated to nuclear medicine, healthcare and environment