^{90}Sr determination in milk

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Nucleco

- operator trained and specialized in the field of radioactive waste management and decontamination of nuclear sites
- is engaged in integrated waste management and radioactive sources and in the decommissioning of nuclear installations

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Activities

- characterization, treatment and conditioning of radioactive waste produced by decommissioning of nuclear power plants
- Nucleco carries out activities aimed at technological development in the field of chemical / physical analisis and in the optimization of the production processes of radioactive waste and toxic-harmful. The chemical laboratory is particularly active in the characterization of cement mortars necessary for conditioning and encapsulation of radioactive waste
- developing methods for the chemical treatment and the extraction of radionuclides from radioactive liquid and solid matrices.

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Why 90Sr determination in milk?

- JRC's environmental monitoring needs the analysis of milk sample taken from the surrounding farms

Other methods:

- UNI 10374 1994: only emergency response (detection limit ≥ 37Bq/L)
- 18 days waiting Yttrium ingrowth for the measurement

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What do we need?

- Rapid sample preparation
  - Effective removal of interferences
  - Consistent tracer/carrier recoveries
  - Rugged and easy to use
- "User friendly" procedures
  - Emergency and routine samples

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Method's details

- Cation exchange resin (cation pre concentrating and organic compound removing)
- Strontium separation (Sr Resin with vacuum-assisted flow rates)
- Liquid scintillation counting
- ICP-MS (chemical yield)

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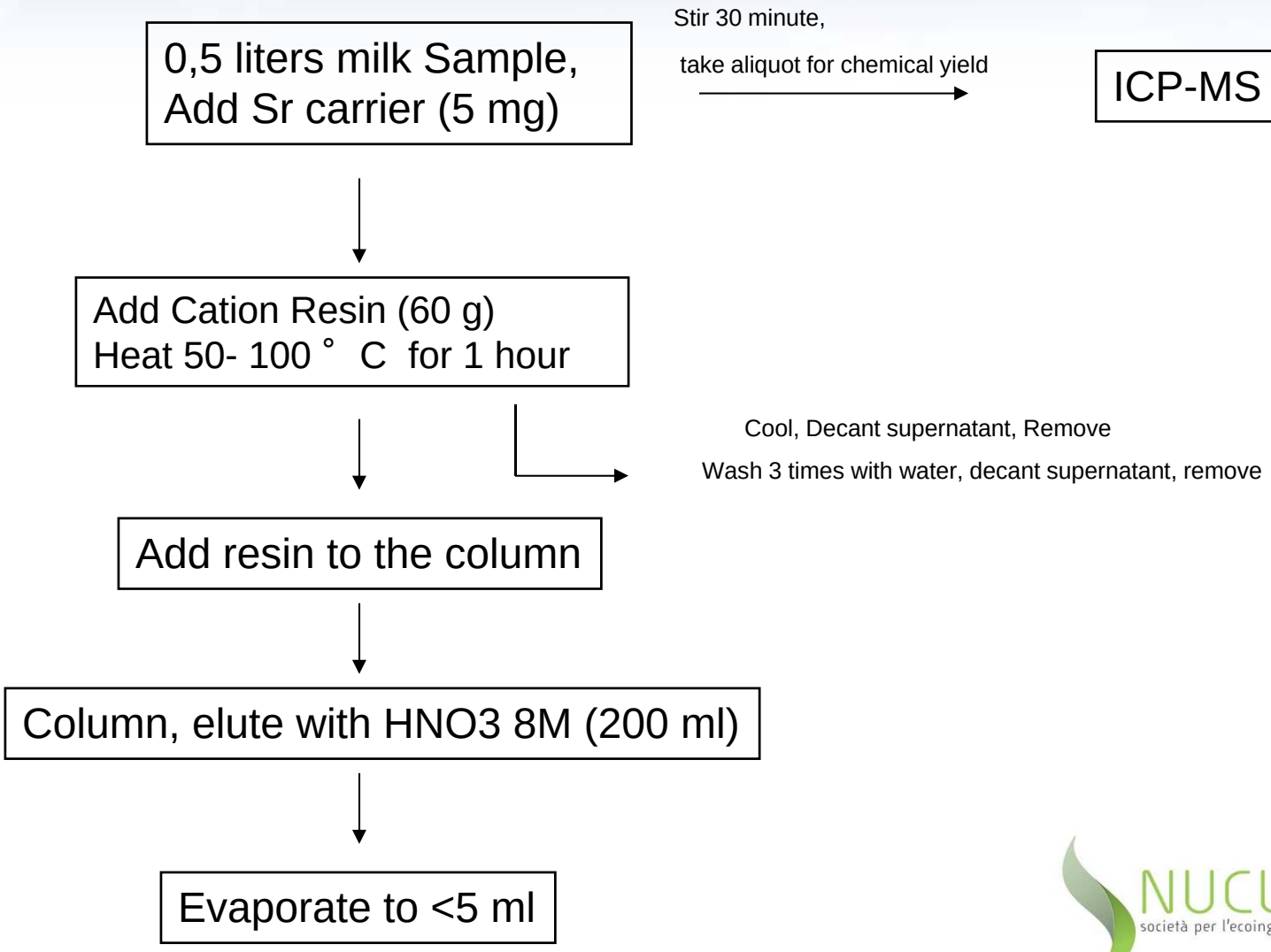
Flowchart of radiostrontium method in milk



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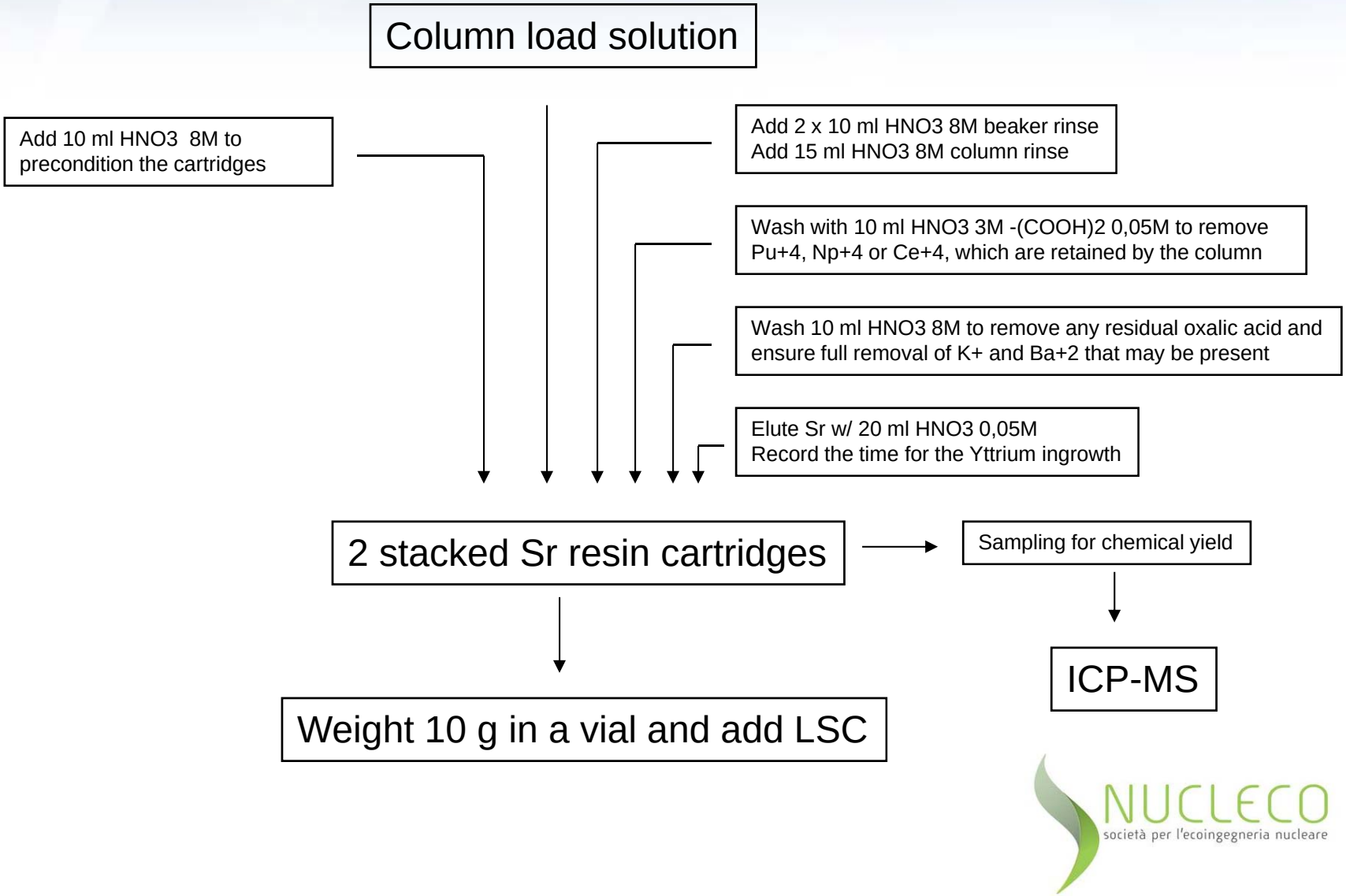

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Cation exchange resin

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Strontium separation

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Why ICP-MS for chemical yield?

Sr stable used as tracer instead of ^{85}Sr allows the reduction of the radiological risk for the operators

^{85}Sr gamma measurement has an uncertainty of 12% Vs. Sr stable ICP MS measurement of 2,5% (k=2, 95%)

LSC background reduced

Faster turnaround times

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^{90}Sr results for 0,5 l spiked milk samples

- **Field of application** 0,1-37 Bq/L
- **Minimum detectable activity (counting time 30 minutes, α = β = 0,05)** 0,13Bq/L

Concentration	Standard uncertainty	Standard deviation of repeatability
0,25 Bq/L	25, 2%	19,6 %
1,8 Bq/L	7,2 %	5,8 %
31,1 Bq/L	5,4 %	1,9 %

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Thanks for your attention!

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