



DUKE COGEMA
STONE & WEBSTER

KCD package NRC presentation

MP BROSSARD
October 19, 2000



DUKE COGEMA
STONE & WEBSTER

KCD Oxalic Mother Liquors Recovery unit

- Design Requirements of MFFF
 - SOW :
 - must be able to provide for receiving 3.5T per year of weapon grade plutonium from PDCF
 - must be able to operate the MFFF such that a minimum of 99.5% of the process charged plutonium is fabricated into commercial quality fuel
 - 10CFR 70
 - Confinement
 - criticality
 - shielding



DUKE COGEMA
STONE & WEBSTER

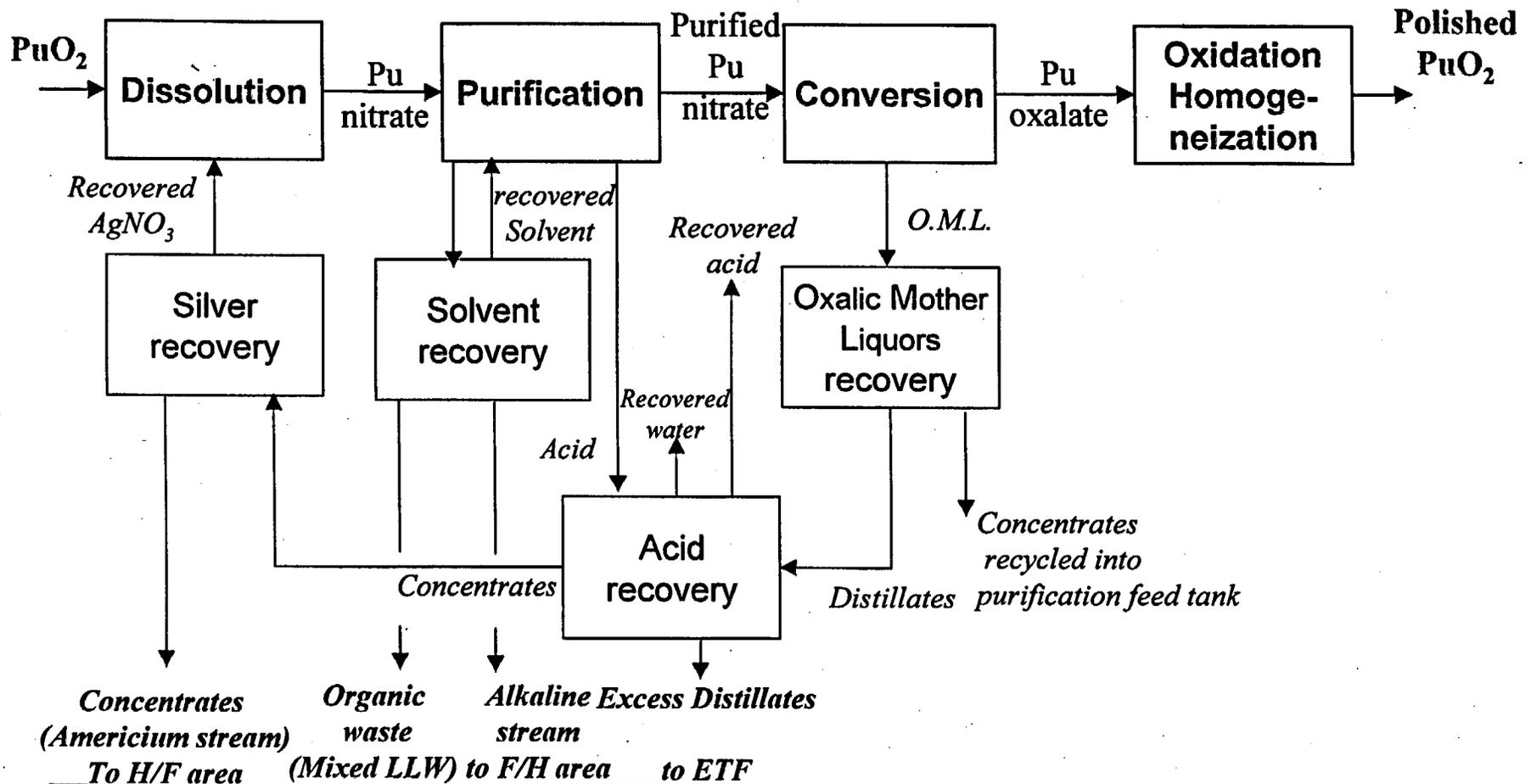
KCD Oxalic Mother Liquors Recovery unit

- Purpose of the Oxalic mother liquors recovery unit
 - continuously receive (96h/week) the oxalic mother liquor from filtration of the Pu oxalate
 - continuously receive the effluents from cap impactor off gas treatment unit
 - concentrate them in an evaporator
 - to destroy the oxalic ions
 - to purify the distillates
 - Monitor and recycles the concentrates in the Purification cycle
 - Check and transfer the distillates to the acid recovery unit



DUKE COGEMA
STONE & WEBSTER

Aqueous Polishing Process





DUKE COGEMA
STONE & WEBSTER

KCD Oxalic Mother Liquors Recovery unit Main Process parameters

- **Process parameters have been established to meet SOW requirements:**
 - OML flowrate is based on the precipitate flowrate which meets the annual Pu capacity
 - ~ 15 kg/year of Pu are recycled through this unit
- Continuous operation (not continuous feeding)
- Feed Characteristics (nominal conditions)
 - Pu content < 0.1g/l,
- Concentrates characteristics
 - Pu content < 10.1g/l, Condensates characteristics



DUKE COGEMA
STONE & WEBSTER

KCD Oxalic Mother Liquors Recovery unit Main equipment data

- **Equipment data are established to meet**
 - **criticality requirements**
 - **Confinement requirements**
 - **process parameters requirements**
- **tanks**
 - **feed and concentrates : Annular and slab tanks (Geometrically safe due to Pu content or possible Pu Content)**
 - **Feed tanks, concentrates tanks stainless steel**
- **Evaporator condenser and condenser and cooler**
 - **geometrically safe (cylindrical)**
 - **equipment made of zirconium**
 - **Thermosiphon boiler heated with vapor produced by its own loop**
 - **tube and bundle condenser and cooler cooled with water (MFFF loop)**



DUKE COGEMA
STONE & WEBSTER

KCD Oxalic Mother Liquors Recovery unit Organization of documents

- general documents for Aqueous Polishing process
 - DRD recall SOW and 10 CFR 70 and main MFFF requirements
 - Basis of design for aqueous Polishing Process criteria: present analogies with La Hague facilities, interfaces with other facilities and Mox Process, operating parameters
 - Choice of process and conversion unit description
 - Block diagram
 - Chemical flowsheet calculation basis
 - Chemical flowsheets
 - Basic data for AP equipment design (in progress not in the package)
-

KCD Oxalic Mother Liquors Recovery unit Organization of documents(cont.)

- Specific documents for the whole Oxalic Mother Liquors Recovery unit
 - Process flow diagram
 - Process description note
 - Control description note
 - instrumentation process data sheet
 - automation process data sheet
 - P&ID's



DUKE COGEMA
STONE & WEBSTER

KCD Oxalic Mother Liquors Recovery unit Organization of documents(cont.)

- Specific documents for each equipment of the Oxalic Mother Liquors Recovery unit
 - Process calculation of equipment notes
 - Process equipment data sheets for tanks
 - equipment data sheets
 - assembly drawings
 - detail drawings