

USEC/NRC MEETING  
Centrifuge  
LEAD CASCADE FOR TESTING  
at a Gaseous Diffusion Plant

NRC Headquarters  
Rockville, Maryland  
August 3, 2001

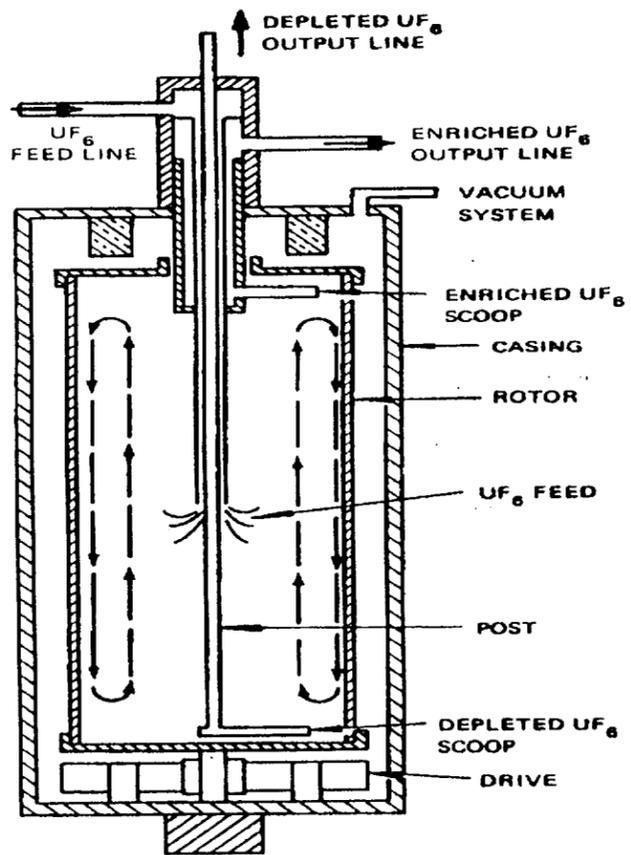
# AGENDA

- OPEN SECTION
  - Introductory and Opening Remarks - Stout
  - Overview of Advanced Technology - Stout
  - Regulatory Aspects of the Lead Cascade - Robles
  
- CLOSED SECTION
  - Technical Aspects of the Lead Cascade - Stout
  
- WRAP-UP
  - Feedback and Follow-up Actions - All

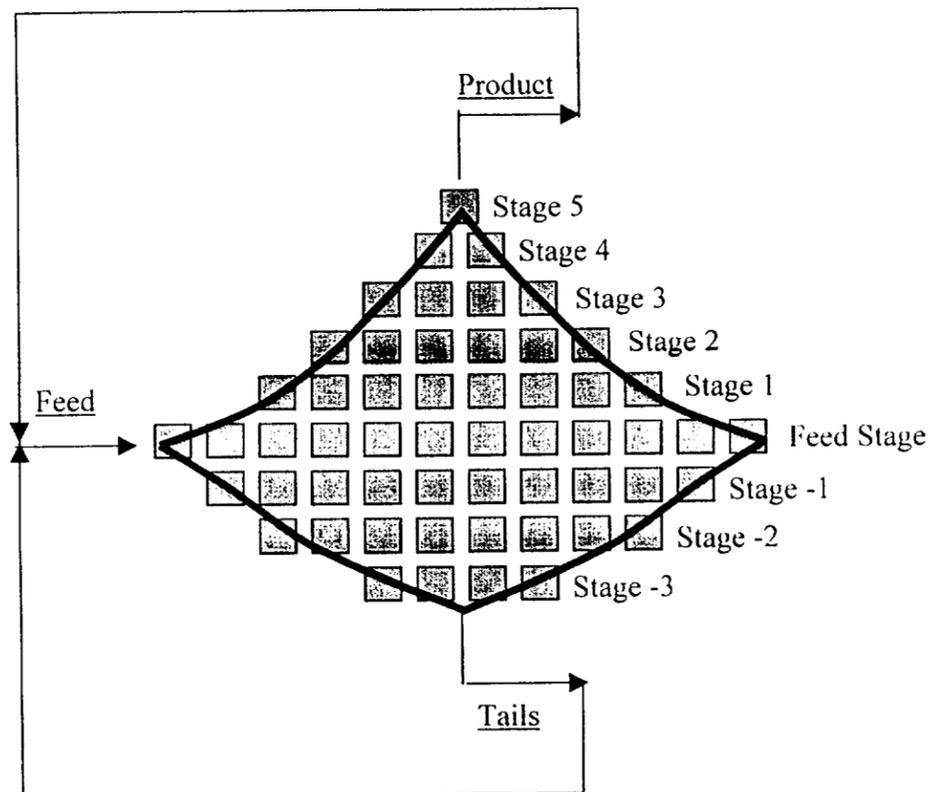
# OVERVIEW OF ADVANCED TECHNOLOGY

- SILEX
- Gas Centrifuge
- Near-term Plans

# Centrifuge Schematic



# Lead Cascade Schematic



Recycle  
Mode

# Benefits of a Lead Cascade

- Tests the basic building block of a uranium enrichment facility
- Develops plant-like manufacture, assembly, installation, operating, and maintenance environment
- Provides a large enough number of machines to determine presence of low frequency “start-up” problems during a reasonable test period
- Allows the analysis of behavior of centrifuge machines and the process (balance-of-plant) as a “system”
- Reduces cost and schedule risk associated with deployment of an uranium enrichment facility
- Spends the least amount necessary to reduce deployment risks

# Historical Perspective\*

- “The development of the United States uranium enrichment capability has progressed to the point where design, construction, operation, and testing of a modular segment of a commercial-scale centrifuge plant is needed”
- “The CPDF will provide facilities for testing and continued development of a unit cascade, which is the basic building block for an industrial size Gas Centrifuge Enrichment Plant . . . A necessary intermediate step in the development of qualified manufacturers of centrifuges and other equipment . . .”

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\* Title I Design Report for Centrifuge Plant Demonstration Facility K-1220, (U) Project No. 77-9-D  
February 1978

# REGULATORY ASPECTS

- SILEX Test Loop
- Centrifuge Lead Cascade for Testing

# SILEX Test Loop

## Regulatory Framework

- Established in NRC letter dated 6/8/01
  - Licensed under 10 CFR Part 70 but not a Uranium Enrichment Facility (cf., 10 CFR 70.4)
  - Laboratory scale facility that is “designed or used for experimental or analytical purposes only”
  - Applicable programs already reviewed and approved by the NRC under Part 76 could be incorporated or referenced in the Part 70 application to streamline the regulatory process

# SILEX Test Loop

## Laboratory Scale Facility

- SILEX Test Loop
  - 250 kg UF<sub>6</sub>
  - 3,600 ft<sup>2</sup> (Process Area)
  - no withdrawal of enriched product except for sampling
- Gaseous Diffusion Plant
  - 300,000,000 kgU
  - 4,000,000 ft<sup>2</sup> (Process Bldgs)
  - 20,000 kg UF<sub>6</sub> enriched product extracted daily

# SILEX Test Loop

## Designed for Analytical Purposes

- Described by USEC in meeting with NRC on 2/2/01 and letter to NRC dated 3/8/01
  - Objectives
    - Evaluate enrichment efficiency in full-scale components
    - Evaluate integrated operation of laser and separator systems
    - Provide basis for plant capital and operating cost estimates
  - Methodology
    - Plant-size or near plant-size components
    - “Closed loop” - recombination of product and tail streams with no enriched product extraction (except for sampling)
    - Testing of components and features unique to SILEX
      - No other essential systems needed for enrichment plant tested (e.g., 30B-cylinder withdrawal or 48X-cylinder feed)

# Centrifuge Lead Cascade Laboratory Scale Facility

- Lead Cascade
  - 250 kg UF<sub>6</sub>
  - 15,000 ft<sup>2</sup> (Process Area)
  - no withdrawal of enriched product except for sampling
- Gaseous Diffusion Plant
  - 300,000,000 kgU
  - 4,000,000 ft<sup>2</sup> (Process Bldgs)
  - 20,000 kg UF<sub>6</sub> enriched product extracted daily

# Centrifuge Lead Cascade

## Designed for Analytical Purposes

### – Objectives

- Evaluate reliability and efficiency of full-scale components
- Evaluate integrated operation of centrifuge machines and cascades
- Provide basis for plant capital and operating cost estimates

### – Methodology

- Statistically meaningful number of plant-size machines
- Recycle operation; no removal of enriched product except for sampling
- Testing of components and features unique to centrifuge
  - No other essential systems needed for enrichment plant tested (e.g., 30B-cylinder withdrawal or 48X-cylinder feed)

# Centrifuge Lead Cascade Regulatory Framework

- Using the principles in NRC letter dated 6/8/01 for SILEX, USEC believes that the Lead Cascade would be:
  - Licensed under 10 CFR Part 70 but not a Uranium Enrichment Facility (cf., 10 CFR 70.4)
  - Considered a laboratory scale facility that is “designed or used for experimental or analytical purposes only”
  - Able to incorporate or reference in the Part 70 application many applicable programs already reviewed and approved by the NRC under Part 76 to streamline the regulatory process

# TECHNICAL ASPECTS OF LEAD CASCADE (Closed Section)

- Presentation of Proprietary Information includes:
  - Lead Cascade for Testing Design
  - Licensing and Operation Schedule
  - Role of Lead Cascade in an Uranium Enrichment Facility

# Conclusion

- USEC would plan to pursue a 10 CFR Part 70 license for a Lead Cascade at a GDP as a Laboratory Scale Facility as part of a program to deploy centrifuge technology in an Uranium Enrichment Facility
- NRC Feedback
- USEC/NRC Follow-up Actions