UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 10, 1999

TO: Robert C. Pierson, Chief
Special Projects Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

THRU: Melanie A. Galloway, Section Chief
Enrichment Section
Special Projects Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

FROM: Drew Persinko, Sr. Nuclear Engineer
Special Projects Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

SUBJECT: SUMMARY OF MEETING WITH DUKE COGEMA STONE & WEBSTER TO DISCUSS DESIGN AND LICENSE APPLICATION FOR THE MIXED OXIDE FUEL FABRICATION FACILITY

On August 31, 1999, the Nuclear Regulatory Commission (NRC) staff met with representatives from Duke Cogema Stone & Webster (DCS) and the Department of Energy (DOE) to discuss design of a mixed oxide fuel fabrication facility (MOX-FFF) and license application submittal schedules. The meeting agenda and slides used in the presentation are attached (Attachments 1 and 2, respectively). Also attached is a list of attendees (Attachment 3).

The meeting began with a brief update of the status of the MOX project by DCS followed by an update of the status of the Part 70 proposed rule and associated standard review plan and the MOX standard review plan by NRC. The Part 70 rule is out for public comment with the comment period closing on October 13, 1999; the staff is also accepting comments on the associated standard review plan. The MOX standard review plan is estimated to be completed in January 2000. DCS presented a design summary that included discussions of process and facility interfaces, the aqueous polishing process, the MOX fuel fabrication process, and preliminary design information in the structural, mechanical, electrical, I&C, safeguards and security and nuclear safety areas. Following the design presentation, participants held a discussion concerning licensing schedules. Preliminary schedules presented by the applicant call for an application to be submitted in September 2000, final design to be completed in March 2002, construction to be completed in March 2006, and startup in April 2006. NRC stated that the governing regulations are 70.23(a)(7), 70.23(a)(8) and 70.23(b). These regulations require that NRC approve the start of construction after it has determined that the design bases of the principal structures, systems, and components and the quality assurance program provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents and after an environmental impact statement (EIS) has been completed. The regulations also require that, before a license is issued to operate a plutonium facility, the NRC must conclude that construction of the principal structures, systems, and components, whose design bases were previously approved by the staff before construction, has been completed in accordance with the application. The staff has not determined the exact mechanism that it would use to allow the start of construction (e.g., letter, license), but the licensing process to be followed will be the same regardless of the mechanism. NRC stated that there can be one or two opportunities for a public hearing and that this is a function of the amount of information submitted by the applicant depending on the path chosen by the applicant. If, at the outset, complete information (design bases, design and operation) is submitted, it is possible to offer one opportunity for a hearing to cover all issues. Alternatively, if the initial submittal includes some lesser amount of information sufficient to support the decision to allow construction to commence but not enough to support issuance of a license to possess material and operate the facility, then there will be two opportunities for hearings. DCS and DOE indicated that a two-submittal approach was more likely due to full information not being available at the time the initial application is submitted.

Since the regulations require that the design bases be approved by NRC, as a minimum, before construction can commence, and Part 70 does not include a definition of design bases, the design bases definition in Part 50 was discussed. The staff concluded that it will review the definition of design bases and include a definition in the MOX standard review plan being developed. In the meantime, the applicant suggested that it will proceed using the Part 50 definition of design bases as a starting point. The NRC staff also suggested that some portions of the application and supporting information (e.g., quality assurance plan and certain computer validation reports) may be submitted before the application is submitted, to support the applicant's proposed schedule. In conclusion, staff suggested that the applicant formulate a revised schedule based on an overall licensing strategy considering information discussed at the meeting. That strategy is a function of the amount of information the applicant intends to include in its initial and subsequent submittals.

Concerning the MOX standard review plan, the applicant indicated that it may be beneficial to discuss the NRC's design bases in priority areas (e.g., criticality) before the draft MOX SRP is released in January 2000. The NRC indicated that it would support these types of meetings before the January 2000 issuance date for the MOX standard review plan for public comment; the applicant will provide a list of priority discussion areas.

The applicant asked how the NRC would address National Environmental Policy Act (NEPA) requirements for the licensing and construction of the MOX facility and if the NRC planned to provide comments on a DOE Environmental Impact Statement (EIS) on MOX. The NRC staff responded that an EIS would be necessary to satisfy NRC requirements under NEPA; the NRC anticipates reviewing DOE's MOX EIS within the context of the MOX license application to determine to what extent the NRC could adopt that work. Since the applicant may submit the DOE's EIS as its environmental report, the NRC will forgo commenting on the EIS at this time.

Attachments:
1. Agenda
2. Slides
3. Attendees

AGENDA

NRC / DUKE COGEMA STONE&WEBSTER (DCS)
MOX MEETING
August 31, 1999

- Introduction of NRC and DCS staff
- Project Status Update (DCS)
- Status Update of 10 CFR Part 70 and NUREG 1520 (NRC)
- Status Update of MOX SRP (NRC)
- MOX Preliminary Design Information Based on MELOX and LaHague (DCS)
- Schedule of Licensing Submittals and NRC Reviews, and Overall Project Design and Construction (DCS and NRC)
- Closing Remarks and Future Activities (DCS and NRC)

ATTACHMENT 1

DUKE COGEMA
STONE & WEBSTER

MOX Fuel Fabrication Project

presentation to

Nuclear Regulatory Commission
Office of Nuclear Materials Safety & Safeguards

DUKE COGEMA STONE & WEBSTER
August 31, 1999

ATTACHMENT 2

Meeting Objectives and Agenda

- Meeting Objectives
  - Reintroduce DCS & new NMSS MOX support staff
  - Present MOX fuel fabrication facility (MFFF) design
  - Discuss licensing details
- Agenda

– Introduction of DCS and new NMSS staff	DCS/NRC
– Project status update	Mathews (DCS)
– Status update on 10CFR70, NUREG-1520	NRC
– Presentation of MFFF design	MFFF Design staff (DCS)
– Licensing submittals and reviews - Round Table	DCS/NRC/DOE
– Identification/resolution of technical issues	DCS/NRC

Opening Remarks

- Review of previous presentation (27 May 1999)
  - Introduction/Points of Contact
  - Overview of MOX project, fabrication facility
  - Discussion of licensing strategy

From 27 May 1999 presentation

Introducing Duke Cogema Stone & Webster, LLC

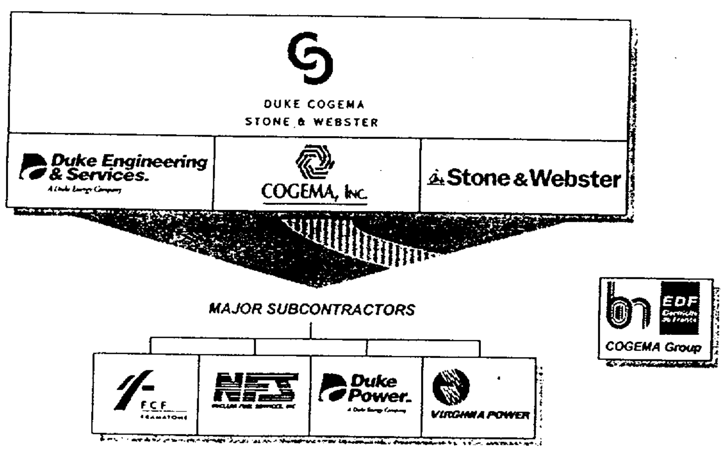
DUKE COGEMA STONE & WEBSTER

- Private-sector consortium contracted by DOE
- Mission: convert plutonium to spent nuclear fuel
  - Design, license, construct, and operate a MOX fuel fabrication facility (MFFF)
  - Perform qualification program for MOX fuel lead assemblies
  - Design shipping containers for MOX fuel assemblies
  - Irradiate MOX fuel at commercial reactors

From 27 May 1999 presentation

Duke, Cogema, Stone & Webster, LLC

DUKE COGEMA STONE & WEBSTER



From 27 May 1999 presentation

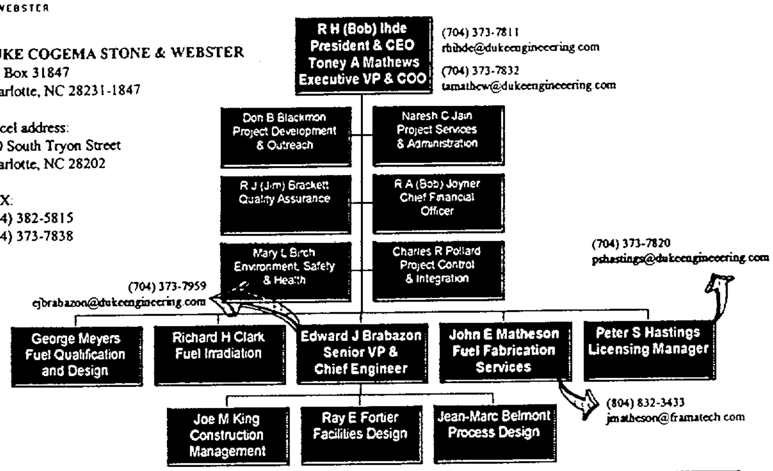
DUKE COGEMA STONE & WEBSTER

DCS Organization/Points of Contact

DUKE COGEMA STONE & WEBSTER
PO Box 31847
Charlotte, NC 28231-1847

parcel address:
400 South Tryon Street
Charlotte, NC 28202

FAX:
(704) 382-5815
(704) 373-7838



From 27 May 1999 presentation

DUKE COGEMA STONE & WEBSTER

MOX Project Overview

- Complements immobilization as part of DOE's surplus plutonium disposition program
- MOX contract divided into four phases
  - Base contract: MFFF plant design and license application; qualification program; identification of utility modifications
  - Option one: construction of MFFF
  - Option two: startup and operation of MFFF; irradiation of MOX fuel
  - Option three: deactivation

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Project Status

- Detailed planning, project baseline, Project Management Plan in DOE review (establishes baseline)
- Interactions with NRR by Fuel Qualification and Fuel Irradiation; qualification and irradiation plans well underway
- Initial Preliminary Design presented to DOE
- QA plan approved, development of QA procedures in progress
- MOX fuel assembly transportation package certification plan in DOE review

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MOX Project Schedule Overview

From 27 May 1999 presentation

• MFFF Final Design	March 2002
• Complete Construction	March 2006
• Facility Startup	April 2006
• Commence batch irradiation at mission reactors	September 2007

(please note all dates are planning estimates)

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MOX Fuel Fabrication Facility (MFFF)

Ed Brabazon
MFFF Engineering Manager

DUKE COGEMA
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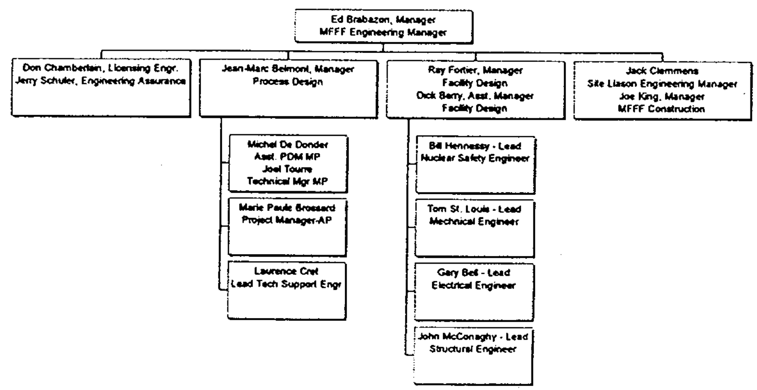
MOX FFF Design Organization



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Design Summary

- General
- Major Assumptions
- Process / Facility Interfaces
- MFFF Interfaces with FQ, FI and PDCF
- Major Technical Accomplishments

General

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- 36-month design schedule
- Major schedule milestones
- Major Components of Design
  - MOX Process Design
  - Aqueous Polishing Design
  - Facility Design
  - License Application

Major Assumptions

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- MOX process (MP) based on MELOX design
- Aqueous Polishing (AP) based on La Hague experience
- Purchase selective equipment overseas
- Initiate equipment procurement in Month 37 (Part of Option 1)
- Will evaluate need for long lead procurement
- Baseline for Pu isotopics composition

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Process / Facility Interfaces

- Process Design develops
  - Process flow diagrams
  - Equipment sizing
  - Initial machine location drawings
- Facility Design develops U.S. Criteria and BOP design
- Process Design developing building layouts
- Facility Design developing initial generic site plan
- Work split on process equipment design based on Type I, II, or III classification

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Process / Facility Interfaces (cont.)

- Both develop equipment specifications (systematic transfer of responsibility).
- Process Group will review and approve the design of process equipment by Facility Group

MFFF Interfaces with FQ, FI and PDCF

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- Pu isotopics
- Pu impurities
- Pu loading w%
- Pu density
- Host site agreements
- Specification for fuel shipping cask

Major Technical Accomplishments - Aqueous Polishing Building

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- Documentation of process choices
- Define process design criteria
- Perform lessons learned from La Hague
- Establish flow diagram
- Outline of description notes
- Perform preliminary criticality calculations notes
- Preliminary sizing of process units for input to general layout

Major Technical Accomplishments - MOX Process (MP) Building

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- Basic principles of plant layout
- Preliminary general flow chart
- Draft safety basis of design
- Draft MP design requirements
- Perform lessons learned from MELOX
- Preliminary sizing of process units for input to general layout
- Perform preliminary criticality and thermal calculations notes

Major Technical Accomplishments - Facility Design

DUKE COGEMA
STONE & WEBSTER

- Drafted design criteria for :
  - Nuclear Technology
  - Structural, civil and geotechnical
  - Mechanical
  - Electrical, S&S and I&C
- Developed conceptual site plan

QUALITY ASSURANCE

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MOX Project Quality Assurance Plan

- Quality Levels
- COGEMA QA Plan
- Design Control
- Design Verification

Design Features & Design Criteria

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- Aqueous Polishing
- MOX Process
- Facilities

Aqueous Polishing and MOX Process main steps

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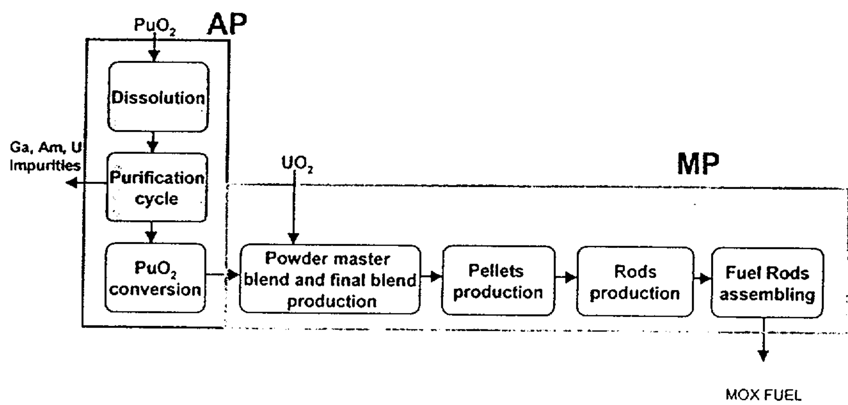

Aqueous Polishing Process

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step 1. PuO_2 Dissolution by **electro-generated Ag(II)**

Process selected because it is very efficient,

independent of PuO_2 powder characteristics,

step 2. Pu Purification by **solvent extraction**

Process selected because it yields very little Pu

leakage and has a very high gallium

decontamination factor.

Aqueous Polishing Process

DUKE COGEMA STONE & WEBSTER

step 3. Conversion into PuO_2 by **oxalate calcination**

Process selected because it yields a PuO_2 powder routinely used for MOX fabrication

This process will be continuous

Aqueous Polishing: Pu Characteristics

W-GRADE Pu

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- Input (Oxide powder from PDCF)
  - granulometry: 100%<500 μm
    99%>5 μm
  - Isotopy: (criticality calculations) ^{239}Pu: <96%; ^{240}Pu:>4%;
  - Specific gravity (criticality calculations): <7
- Impurities
  - ^{241}Am<0.7%
  - Ga<12000 μg/g of Pu
  - others impurities section H4 of SOW

Aqueous Polishing: Pu Characteristics
W-GRADE Pu

DUKE COGEMA STONE & WEBSTER

- Output (Sinterable Oxide powder)

  Isotopy: (criticality calculations)

  ^{239}Pu : <96% ; ^{240}Pu :> 4% ;

  - Specific area:~10 $m^2.g^{-1}$
  - Granulometry: :~14 µm
  - ^{241}Am < 5 ppm
  - Ga < 0.1 µg/g of Pu
  - Specific gravity: :~1.7
  - Specific gravity (criticality calculations):<3.5
  - Humidity content (criticality calculations) : 3%

DISSOLUTION PROCESS MAIN EQUIPMENT

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DECANNING EQUIPMENT (located in glove boxes)

Designed to allow the opening of ARIES Type cans (crimped lid) and BNFL Type cans (screwed lid)

It is assumed that the ARIES convenience can will be modified to reduce Pu waste (to be determined with PDCF)

DISSOLVER (located in a glove box)

Geometrically safe equipment

Made of TITANE to eliminate corrosion problems

Volume: ~ 56L

FILTER (located in a glove box)

To remove any remaining PuO_2 (The dissolution is complete under normal operation)

Below the smallest particle diameter

RECEIVING VESSEL (located in a limited access room)

Made of TITANE to eliminate corrosion problems

Geometrically safe equipment

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PURIFICATION PROCESS MAIN EQUIPMENT

PULSED COLUMNS for purification (located in a limited access room)
- Extraction
- Acid scrubbing
- Pu stripping
- Raffinates diluent washing

This equipment is used at the UP2-800 and UP3 plants.
The HETS is less than one meter and is constant (UP3 has operated for 10 years).

MIXER SETTLERS for solvent regeneration (located in a compartment topped by a glove-box)
- Pu barrier
- Solvent regeneration steps
  - sodium carbonate washing
  - soda washing
  - nitric acid washing

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CONVERSION PROCESS MAIN EQUIPMENT

PRECIPITATORS (2 in the polishing facility)
- Located in a glove box
- Pyrex stirred bowl
- Magnetic stirrer

FILTER
- Located in a glove box
- Flat, under vacuum filter

FURNACE
- Located in a glove box
- Electrically heated cylinder
- Rotary screw located inside the furnace moves the powder
- The screw speed is adjusted to control the mean residence time in the calcination section

CONVERSION PROCESS MAIN EQUIPMENT

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- HOMOGENIZERS
  - Located in a glove box
  - 2 geometrically safe tumbling mixers
  - Capacity 24 kg (about one day of production)
  - Sized to cool the powder.

CANNING MAIN EQUIPMENT

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INTERMEDIATE CAN

Same dimensions as the La Hague convenience can, to reuse COGEMA canning equipment (proven technology and existing design)

Screwed or expendable seal lid (TBD)

CANNING SYSTEM

Located in Glove boxes
Reuse of the existing canning head of La Hague T4 facility

TRANSFER TO THE MP

Pneumatic transfer
for security reasons
to avoid decontamination of the reusable cans

Aqueous Polishing Design Criteria

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Principle design criteria for Aqueous Polishing process are:

- Transfer of proven dissolution, purification, conversion processes
- Transfer of proven technology from La Hague plant, or Marcoule plant ~80 % of process equipment
- Weapon grade Pu received from PDCF
- Aqueous Polishing process throughput: 3.5T/Year
- Waste strategy (EIS is bounding)

MOX Process

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- A-MIMAS Principles
- Flowchart of production line
- Typical process units
  - Primary dosing
  - Secondary dosing

MOX PROCESS GENERAL FLOW CHART

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- Main bases for the flow chart are :
- Sole type fuel assembly design (PWR)
- Pu content in primary blend : 20 %
- Scraps recycling rate capability : 16 % (in final product)
- Operating period for the entire MOX process : 42 weeks / yr
- Process charged Pu into commercial quality fuel : 99.5 %

MOX PROCESS LAYOUT

MAIN DEVELOPMENT AND ADAPTATION FROM MELOX

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Incorporated in the present layout :

- Room arrangement based on contamination hazard
- Heavy units located on ground floor
- Process areas C3 surrounded by corridors
- No C3 process areas on building perimeter
- Electrical and control cabinets close to the related process units

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MOX Process Design Criteria

Principle design criteria for MOX process are :

- Transfer of proven A-MIMAS process
- Transfer of proven technology from MELOX ~80 % of process equipment
- Weapon grade Pu
- U.S. Plant throughput : 70 MTHM / yr
- Fuel specification according to FRAGEMA technical file
- 99.5 % of process charged Pu into commercial quality fuel
- Waste strategy (EIS is bounding)

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Facilities Design

- Design Features
- Design Criteria

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Site Concept - Design Features

- Personnel access
- Commercial truck deliveries
- Change rooms, rest rooms and lunch room outside the MMA
- SSTs will transport oxide to the MFFF truck bay.
- SSTs will transport MOX fuel assemblies offsite from MFFF truck bay.

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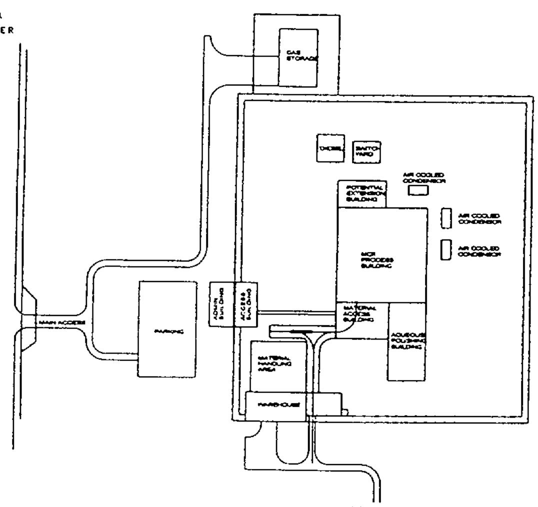
Facility Features - Conceptual Site Layout



Facility Design Criteria

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- Draft Basis of Design documents developed
  - Structural
  - Mechanical
  - Electrical / I&C/S&S
  - Nuclear Safety
- Designate
  - quality classifications
  - general requirements
  - applicable codes and standards
  - specific requirements

Structural

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- Draft BOD documents prepared
  - Structural Design
  - Architectural Design
  - Site/Geotechnical Design
- No significant differences compared to normal DOE/NRC Practices
- Codes & Standards consistent with NRC expectations
- Acceptance Criteria consistent with risk-based safety classification

Structural

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- Structural Design BOD will be referenced/invoked by individual SSC description
- Architectural Design will be conventional quality and address facility access, occupancy and site planning
- Site/Geotechnical BOD defines foundation design requirements
- Site/geotechnical BOD sets site configuration requirements and relationships between facilities

Mechanical

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- Fluid Systems BOD
- HVAC Systems BOD
- Building Service Systems BOD
- Fire Safety BOD
- Equipment BOD
- Seismic BOD

Mechanical

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- Establishes Design Requirements for systems and equipment
- Establishes applicable design Codes and Standards
- Establishes U.S. Requirements for glovebox design
- Functional safety & quality requirement documents
- Incorporates Host Site Requirement

Electrical

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- Electrical Basis of Design
- I&C Basis of Design
- Safeguards and Security Basis of Design

Electrical

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- General description of the electrical system layout
  - Normal standby emergency power sources
  - Electrical system availability
- Applicable Codes and Standards
- Raceway design requirements
- Wire and Cable design requirements
- Exterior Utility Service
- Interior Utility Service

Electrical

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- Grounding
- Lighting
- Standby and Emergency Power
- Protection Philosophy
- Separation and Physical Independence

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Electrical Systems

- Communications and Alarm Systems
  - The requirements for the various communications sub-systems used within the facility as well as offsite communications methods will be described
- Heat Tracing and Freeze Protection
- Cathodic Protection

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Instrumentation and Controls

- General Requirements
  - Provides general requirements for instrument and control
- Codes, Standards, And Guides
  - Identifies NRC Requirements and Guidelines
  - Identifies Industry Codes and Standards (ANS, EPRI, IEEE, ISA, NEMA, NFPA, SAMA, UL)

Instrumentation and Controls

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- Instrumentation Systems
  - Monitor variables and systems over their anticipated ranges of operation
  - Display instrumentation provides accurate, complete, and timely information pertinent to system status
  - Graphics displays represent process equipment schematically.

Instrumentation and Controls

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- Control and Protection Systems
  - Prevent the unmonitored release of radioactive material and prevent the inadvertent occurrence of a criticality
  - The Plant Control System is PLC based
  - The Plant Protection System is PLC and hardwired based distributed control system independent of the control system

Safeguards and Security

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- General Requirements
  - Threats
  - Protection of Special Nuclear Material & Vital Equipment
  - Security & Restricted Access Areas
- Applicable Codes and Standards
  - Provides definition of applicable DOE orders and manuals, NRC required documents and industry codes and standards

Safeguards and Security

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- Specific Requirements
  - Intrusion Detection and Assessment Systems
  - Access Control & Entry/exit Inspection
  - Barriers & Locks
  - Secure Storage
  - Communication Maintenance Power
  - Nuclear Material Control & Accounting Safeguards

Nuclear Safety

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- Integrated Safety Analysis
- Nuclear Criticality Safety
- Environmental Permitting
- Radiation Protection
- Emergency Preparedness
- Deactivation
- Waste Management

Nuclear Safety

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- Integrated Safety Analysis
  - Based on requirements from proposed10 CFR 70 changes (6/2/99), NUREG-1520, NUREG-1513, OSHA, EPA
- Nuclear Criticality Safety
  - Accidental criticality prevention, double contingency, crit monitors, NCS admin control program described
- Environmental Requirements
  - Air, surface water, drinking water, RCRA, noise control are described.

Nuclear Safety

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- Radiation Protection
  - RP design features are described, including an ALARA Design: facility layout, rad zone maps, access control, containment and confinement, shielding
  - Includes Rad monitoring: area, airborne, and effluent
  - Also Health Physics: facilities and equipment, outside/host site support
- Emergency Preparedness
  - Host Site: site Emergency Plan input
  - Emergency response organization, facilities, equipment

Nuclear Safety

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- Deactivation
  - Deactivation is an intermediate step between shutdown & decommissioning
- Waste Management
  - Includes TRU waste storage, glovebox dust abatement, shipping containers, deactivation
  - WIPP and host site WAC

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MFFF Design Topics

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Safety

- Preliminary Hazards Analysis (PHA)
  - Good engineering practice
  - Early identification of significant impacts on the MOX FFF design
  - Support of the initial identification of IROFS
  - Support of functional classification of equipment
  - Identify initial bounding hazards and accidents for initial screening process

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Safety

- Evolving 10 CFR Part 70.61
  - Extension of performance requirements in 10 CFR Part 20
  - General incorporation of accident performance requirements
  - Additional requirements with regard to worker safety
  - Clarification of chemical safety performance requirements
- Issues associated with worker dose
  - May impact MELOX design to address worker dose
  - May add complexity to the design
  - May lead to operations and maintenance concerns
  - Requires detailed analysis

Safety

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Chemical Process Safety/ Monitoring

- 29 CFR 1910 - OSHA worker safety
  - Memorandum of Understanding (MOU) between NRC and the Occupational Safety and Health Administration (OSHA)
- 40 CFR 68 - EPA Risk Management Programs
  - Development of Risk Management Plan
- Aqueous Polishing chemical monitoring and control

Nuclear Criticality Safety

DUKE COGEMA STONE & WEBSTER

- Criticality Safety Programs
- Criticality Safety Criteria
- Criticality Control
- Evaluation Methodology
- Benchmark Determination

Criticality Safety Programs

DUKE COGEMA STONE & WEBSTER

- Administrative programs in accordance with ANS-8.19-1996, Administrative Practices for Nuclear Criticality Safety
- QA program in accordance with ANS-8.19-1996, Administrative Practices for Nuclear Criticality Safety
- Training program in accordance with ANS-8.20-1991, Nuclear Criticality Safety Training
- Operational inspections, audits, assessments, and investigations function to be regularly performed in accordance with standard NCS principles

Criticality Safety Criteria

DUKE COGEMA STONE & WEBSTER

- Double contingency principle compliance
- Criticality Analysis
  - Upper Safety Limit (USL)
    - Administrative safety margin, Δk_m
    - Account for method bias and uncertainty based on statistical analysis of benchmark experiment results
  - Worst-case treatment or statistical accounting for design, mechanical, material, and fabrication uncertainties
- Single parameter limits of ANSI/ANS-8.1

Criticality Control

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STONE & WEBSTER

- Criticality Control Modes
  - Geometry control whenever possible
  - Mass and moderation control when required for process and operability reasons

Nuclear Criticality Safety Evaluation Methodology

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- NCSEs prepared according to standard US procedures and criticality methodologies (based on ANSI/ANS-8.1 as invoked by RG 3.71)
- U.S. standard criticality code (KENO) and neutron cross-sections included in SCALE 4.4 applied
- NCSEs originated by the Process Group
- NCSEs independently reviewed by the Facility Group

Benchmark Determination

DUKE COGEMA STONE & WEBSTER

- Process selection & data analysis
- Validation
- Sensitivity and uncertainty techniques
- Available benchmark experiments

Criticality Summary

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- Standard US Criticality Safety Evaluation Methodology
- Procedure has been prepared to ensure standard US methodology is used
- Standard US criticality code (KENO/Scale 4.4) will be used
- Criticality calculations will be validated using the latest methods of benchmark validity determination including parameter trending analysis and ORNL methods
- Standard administrative uncertainties will be used
- Nuclear Criticality Safety Evaluations will be originated by the Process Group and independently reviewed by the Facility Group
- Criticality Safety Administrative Programs will be used on the MFFF

Radiation Protection

DUKE COGEMA STONE & WEBSTER

- Regulatory
  - 10CFR70, Domestic Licensing of Special Nuclear Material
  - 10CFR20, Standard for Protection Against Radiation
- Primary Guidance documents
  - Regulatory Guides
  - NUREGs
  - ANSI Standards
  - ICRP Publications

Radiation Protection

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- Removes 241Am [241Am/(241Am+ Pu Total)] < 0.0005%
- Automated operations
- Major radiation sources in shielded cubicles
- High maintenance equipment separated
- Radioactive source material removed for maintenance

Radiation Protection

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- Exposure limited through automation and remote control
- Biological shields placed between radiation sources and operators
- Reduced radiation
  - PuO_2 Powder
  - C-Pu/W-Pu ≈ 5 X DER
- Same shielding as MELOX - reduced occupational exposure
- Occupational exposure goal: ALARA

Radiation Protection

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Shielding Calculations

- Based on MELOX results of shielding and dose calculations
  - Revise to support design changes
  - Perform calculation to support new designed units
- Computer codes (U.S.)
  - SCALE 4.3 or 4.4
  - MCNP 4B or 4C

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Radiation Protection

- Radiation Monitoring - Selected Equipment
  - External Radiation
    - Local Area Monitors (Gamma & Neutron)
  - Internal Radiation
    - Continuous Air Monitors - movable/ near breathing zone
    - Continuous - General area airborne sampling - laboratory analysis
    - Operator foot-pedal for glove-box entries
      - Moveable - covers all glove-ports
      - Notification for glove tear/other problems
      - Remote alarms - Health Physics & Control Room
- Particulate Monitoring

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Confinement Systems Design

Static Confinement

- Confinement barriers
  - First confinement system
    - Solution-containing vessels, powder-containing equipment completed by gloveboxes or cells (AP)
  - Second confinement system
    - Process rooms and building

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Confinement Systems Design

Dynamic Confinement

- Confinement Zones Exhaust & Depressurization Systems for MFF and Polishing Buildings include:
  - Glovebox Nitrogen Blanketing
  - Primary Confinement Zone C4 Exhaust (Very High Depressurization THD)
  - Secondary Confinement Zone C3 Exhaust (High Depressurization HD)
  - Tertiary Confinement Zone C2 Exhaust (Moderate Depressurization MD)
  - Clean Areas Exhaust System Zone C1 (Conventional HVAC system)
  - Number of HEPA filters on exhaust depends on contamination risk

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Fire Safety Design Features at MFFF

- Fire Areas With Minimum of 2 Hour Rated Fire Barriers
- Automatic and Manual Fire Suppression Capabilities
- Automatic Fire Detection Systems throughout
- Facility Wide Fire Alarms throughout
- Fire Prevention

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Electrical System

MAJOR FEATURES

- Redundant Preferred (Normal) Power Feeds
- Essential and Emergency Diesel Generators
- Electrical Separation Per IEEE 384

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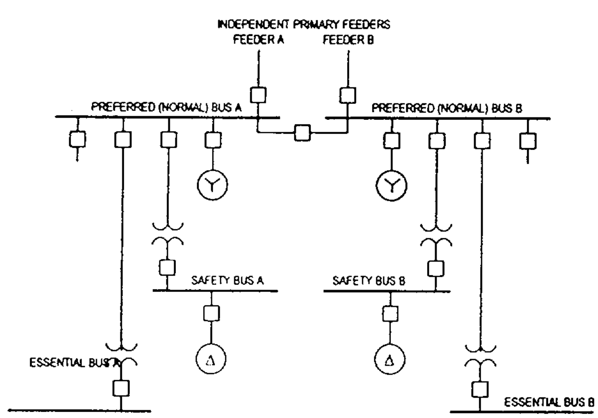
Simplified Electrical One-Line



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Instrument and Controls

MAJOR FEATURES

- Control By Programmable Logic Controllers With Operator Interfaces
- Control is Unitized
- MMIS Provides Supervision and Data Storage
- Redundancy When Required
- Safety Trips Hardwired

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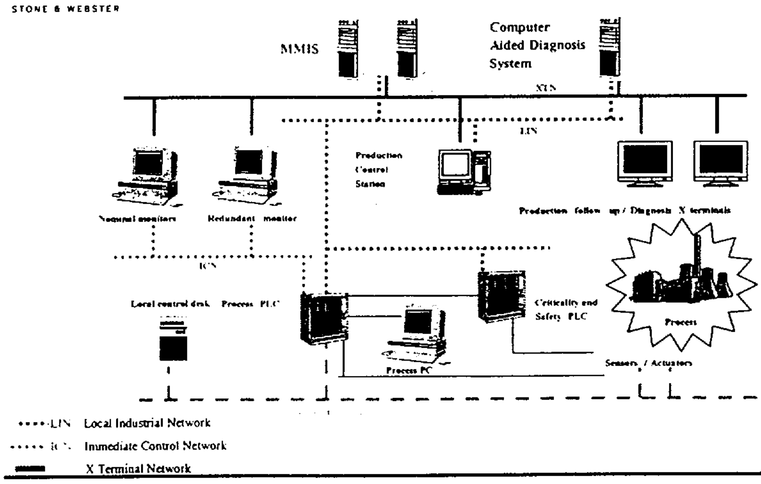
Control System Architecture



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Safeguards

- MAJOR FEATURES
- Measurement, Control and Accountability Program in Accordance with 10 CFR Part 74, Subpart E
- Fundamental Nuclear Material Control Plan Will be Prepared In Accordance with NUREG-1280
- Program Will Use Classic Safeguards Techniques
- IAEA Interface via 10 CFR Part 75

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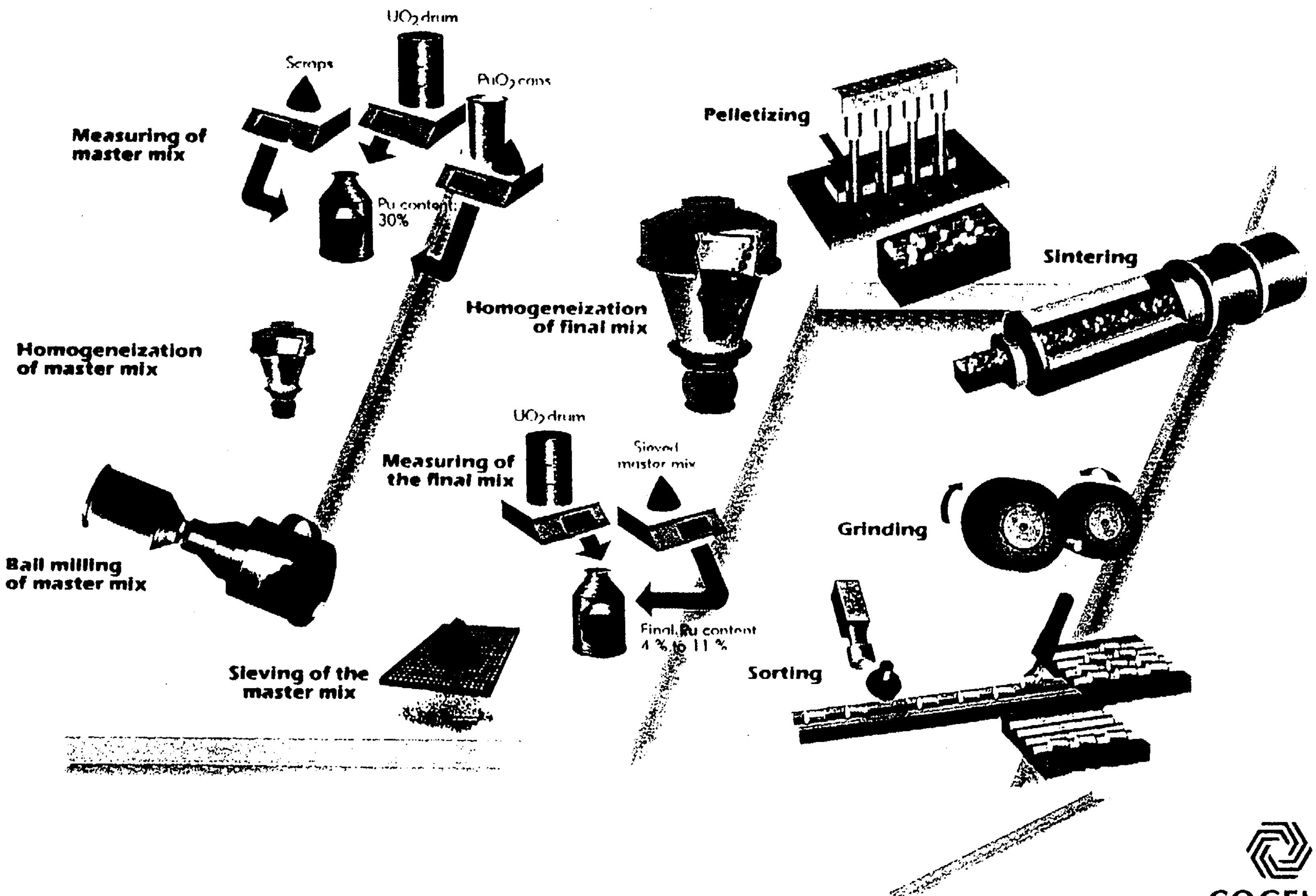
Security

MAJOR FEATURES

- Security program will be in accordance with Department of Energy Orders
- MOX Fuel Fabrication Facility will be constructed at a DOE site and will be protected by DOE contracted security forces
- Level of integration of the Fuel Fabrication Facility security system into the host site security system will be determined after the Record of Decision

THE A-MIMAS FUEL FABRICATION PROCESS AT MELOX PLANT



COGEMA

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MFFF Licensing
Round Table Discussion

MFFF Licensing
Round Table Discsussion

Construction Authorization and Operating License

- §70.23(b): requires "Commission approval" for construction of a plutonium facility
- Information required for submittal described in §70.22(f) (design basis information)
- How will NRC go about authorizing construction?
- How does new ISA requirement impact process?

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