

**U.S. DEPARTMENT OF ENERGY  
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**PRESENTATION TO  
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD**

**SUBJECT: WEST VALLEY DEMONSTRATION  
PROJECT HIGH-LEVEL WASTE  
QUALIFICATION ACTIVITIES**

**PRESENTER: DR. RONALD A. PALMER**

**PRESENTER'S TITLE  
AND ORGANIZATION: PRINCIPAL ENGINEER  
WEST VALLEY NUCLEAR SERVICES COMPANY  
WEST VALLEY, NEW YORK**

**PRESENTER'S  
TELEPHONE NUMBER: (716) 942-4934**

**AUGUST 28-29, 1990**

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# **WEST VALLEY DEMONSTRATION PROJECT**

## **● OBJECTIVE**

- DEMONSTRATE SOLIDIFICATION AND PREPARATION OF HIGH-LEVEL WASTE (HLW) FOR PERMANENT DISPOSAL

## **● AUTHORITY**

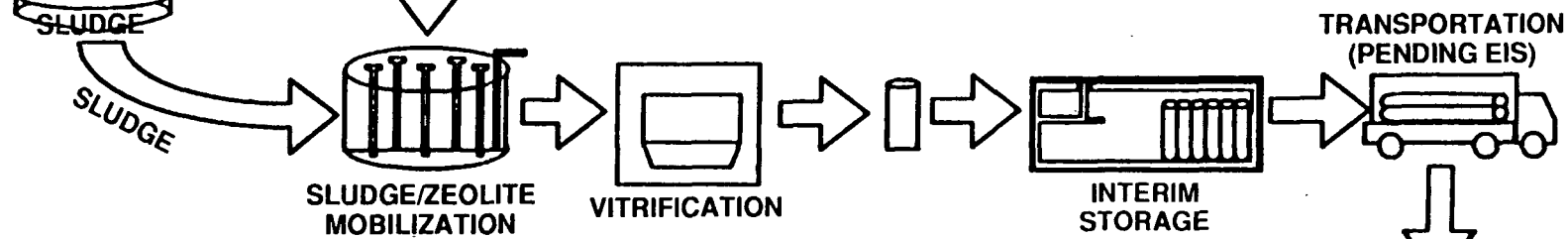
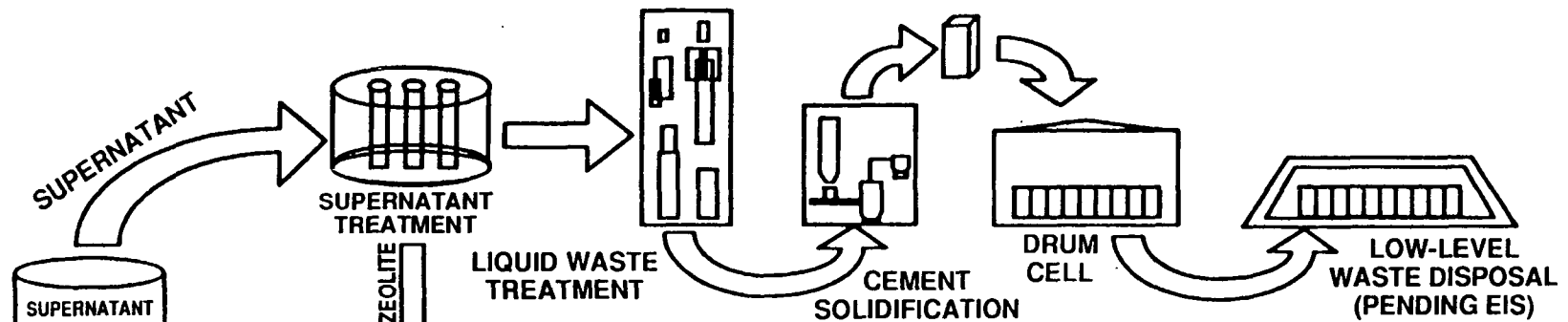
- PUBLIC LAW 96-368
- WEST VALLEY DEMONSTRATION PROJECT ACT

## **● SCOPE**

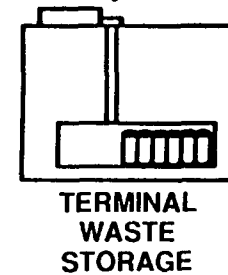
- SOLIDIFY LIQUID HIGH-LEVEL WASTE
  - \* CEMENT SOLIDIFICATION SYSTEM
  - \* VITRIFICATION
- DECONTAMINATE AND DECOMMISSION FACILITIES

# PROCESS OVERVIEW

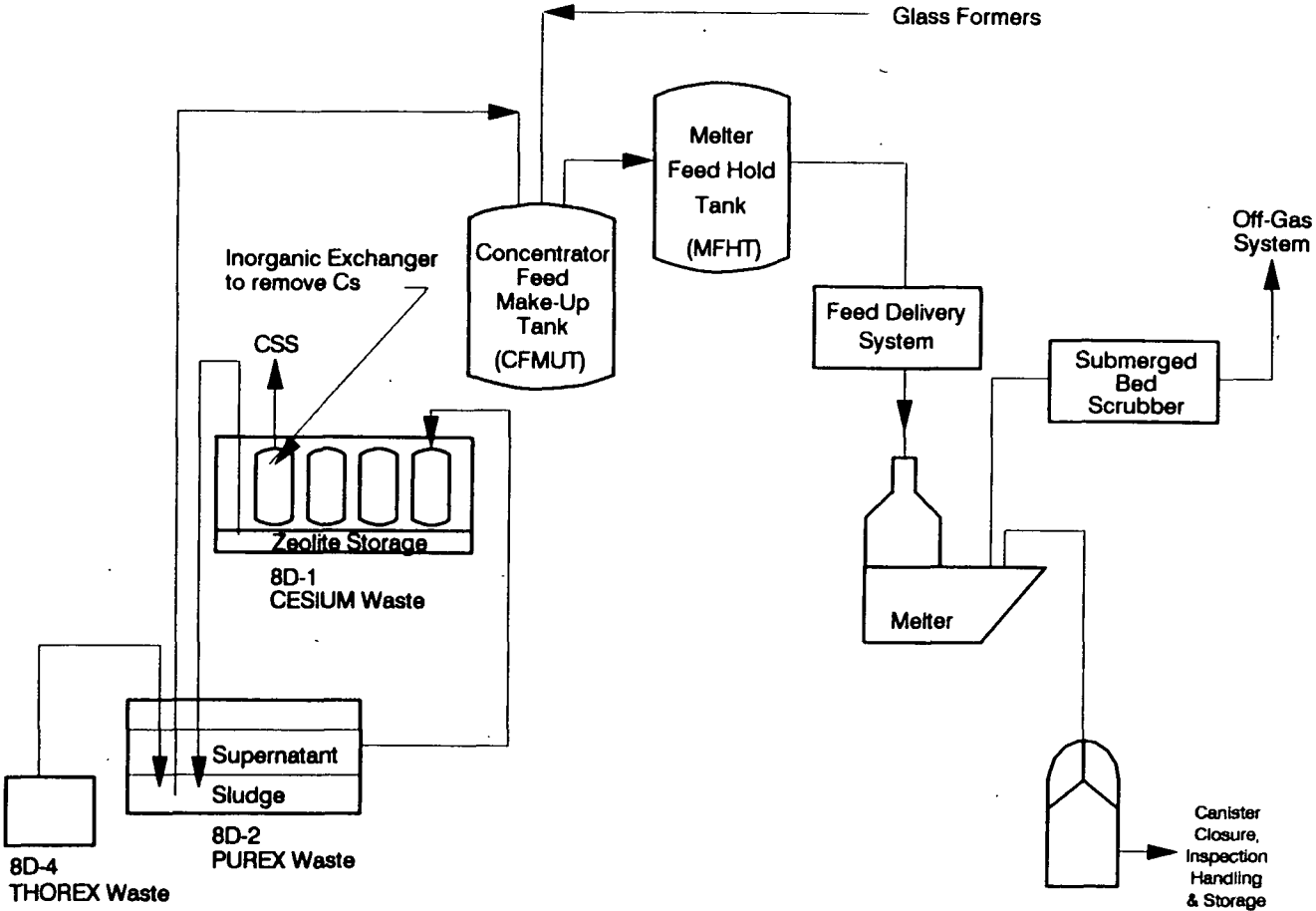
## LOW-LEVEL WASTE PROCESSING CYCLE



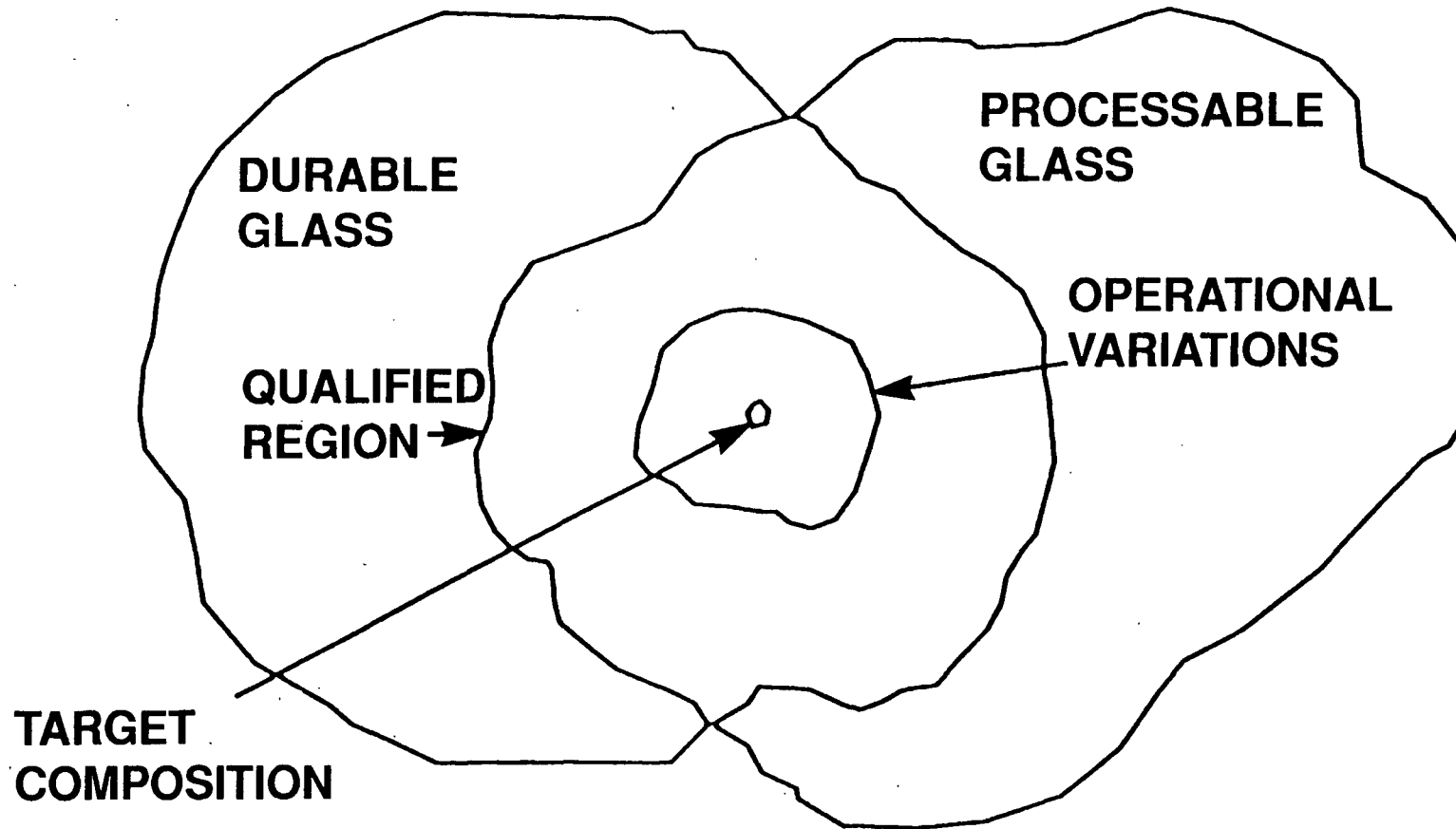
## HIGH-LEVEL WASTE PROCESSING CYCLE



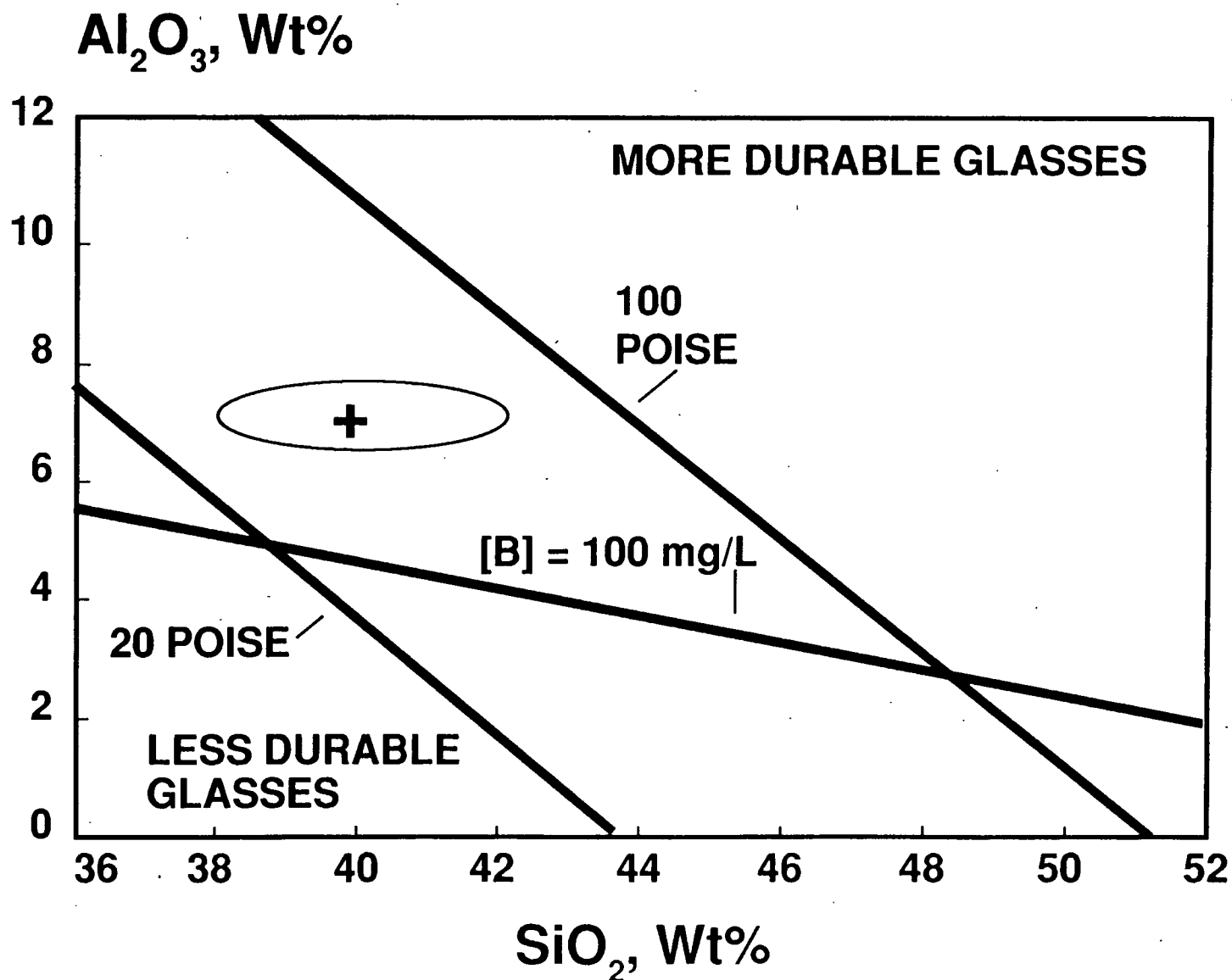
# WEST VALLEY HLW PROCESSING FLOW SHEET



# SCHEMATIC OF PROCESS AND PRODUCT QUALIFICATION



# ACCEPTABLE GLASSES



# DURABLE GLASS REGION

<u>GLASS OXIDES</u>	<u>COMPOSITION (WT. %)</u>	<u>LOWER BOUND</u>	<u>UPPER BOUND</u>
Si	43.1	38.0	45.0
Al	6.2	5.0	10.0
Fe	12.2	10.0	16.0
B	10.9	6.9	13.0
Na+K+Li	17.8	12.0	20.0
P	2.4	0.5	4.0
Mn	1.0	0.1	2.0



# **STRATEGY FOR MEETING RADIONUCLIDE RELEASE SPECIFICATION**

- **ESTABLISH RANGE OF ACCEPTABLE COMPOSITIONS WHICH ARE ALSO PROCESSABLE**
- **ESTABLISH SAMPLING REGIMEN**
  - **METHODS TESTED DURING QUALIFICATION RUNS**
  - **COMPARING MELTER FEED WITH OUTPUT GLASS**
  - **STATISTICAL PROCESS CONTROL**
- **FEED TANK SAMPLING**
- **TEMPERATURE CONTROL**
- **GLASS SAMPLING**
- **DURABILITY TESTING**

# **MEETING WASTE ACCEPTANCE PRELIMINARY SPECIFICATION 1.3: LAYING THE GROUNDWORK**

- **DURABILITY TESTING (LEACHING)**
  - MATERIALS CHARACTERIZATION CENTER -1 TEST
  - PRODUCT CONSISTENCY TEST (PCT)
  
- **GLASS MODELING (COMPOSITION VS. DURABILITY)**
  - EMPIRICAL MODELS
  - CHEMICAL MODELS
  - EXPERIMENTAL CONFIRMATION
  
- **LAB QA/QC PROGRAM**
  - TESTING DURING QUALIFICATION RUNS
  - STATISTICAL PROCESS CONTROL

# QUALIFICATION RUNS: RESULTS

- **OPERATED UNDER WIDE RANGE OF CONDITIONS**
  - FEED RHEOLOGY
  - GLASS COMPOSITION
  - REDOX CONDITIONS
  - TEMPERATURE
  
- **ANALYZING VIRTUALLY EVERYTHING**
  - FEED VS. GLASS COMPOSITION
  - FINAL GLASS COMPOSITION (IN CANISTERS)
  - GLASS DURABILITY
  - FINAL MELTER CONDITION
  - ALL AS A FUNCTION OF PROCESSING CONDITIONS
  
- **ALL DATA FEED PROCESS AND PRODUCT MODELS**

# **WEST VALLEY DEMONSTRATION: SUMMARY**

- **FULL-SIZED INTEGRATED PROCESS TESTED**
- **GLASS COMPOSITION REGION DEFINED**
  - NOW CONFIRMING EDGES
  - TARGET WILL BE NEAR THE CENTER
- **STATISTICAL PROCESS CONTROL**
  - METHODS IN PLACE
  - FINALIZING DETAILS
- **QUALIFICATION TESTING COMPLETE**
  - PLAN ONE YEAR SHAKE-DOWN OF NEW MELTER