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

PRESENTATION TO THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: HIGH-LEVEL WASTE GLASS PRODUCERS OVERVIEW

PRESENTER: ROBERT W. BROWN

PRESENTER'S TITLE AND ORGANIZATION: DEPUTY PROJECT MANAGER
VITRIFICATION PROJECT OFFICE
U.S. DEPARTMENT OF ENERGY
RICHLAND, WASHINGTON

PRESENTER'S TELEPHONE NUMBER: (509) 376-7391

AUGUST 28-29, 1990

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BACKGROUND

- THE WEST VALLEY DEMONSTRATION ACT OF 1980 MANDATED THE CLEANUP AND CLOSURE OF THE FORMER WEST VALLEY COMMERCIAL FUEL REPROCESSING SITE

- IN ACCORDANCE WITH PUBLIC LAW 97-90, THE PRESIDENT SUBMITTED THE DEFENSE WASTE MANAGEMENT PLAN (DWMP) TO CONGRESS IN JUNE 1983. THIS PLAN DESCRIBED THREE MAJOR HIGH-LEVEL WASTE PROCESS FACILITIES TO BE BUILT IN SEQUENCE AT THREE DOE SITES:

- DEFENSE WASTE PROCESSING FACILITY (DWPF)	SAVANNAH RIVER SITE
- HANFORD WASTE VITRIFICATION PLANT (HWVP)	HANFORD SITE
- IDAHO FACILITY	IDAHO SITE

WASTE PRODUCERS HLW OVERVIEW

ORIGIN OF HLW

SITE	SOURCE/ORIGIN	CURRENT CONDITION
SAVANNAH RIVER	DEFENSE PRODUCTION OF SPECIAL NUCLEAR MATERIALS (SNM) - REPROCESSED FUEL	NEUTRALIZED; LIQUID AND SLUDGE STORED IN CARBON STEEL TANKS
WEST VALLEY	COMMERCIAL REPROCESSED FUEL; AEC/DOE EXPERIMENTAL FUEL	NEUTRALIZED; SLUDGE AND SUPERNATANT
HANFORD	DEFENSE PRODUCTION OF SNM REPROCESSED FUEL	NEUTRALIZED; LIQUID AND SLUDGE STORED IN CARBON STEEL TANKS

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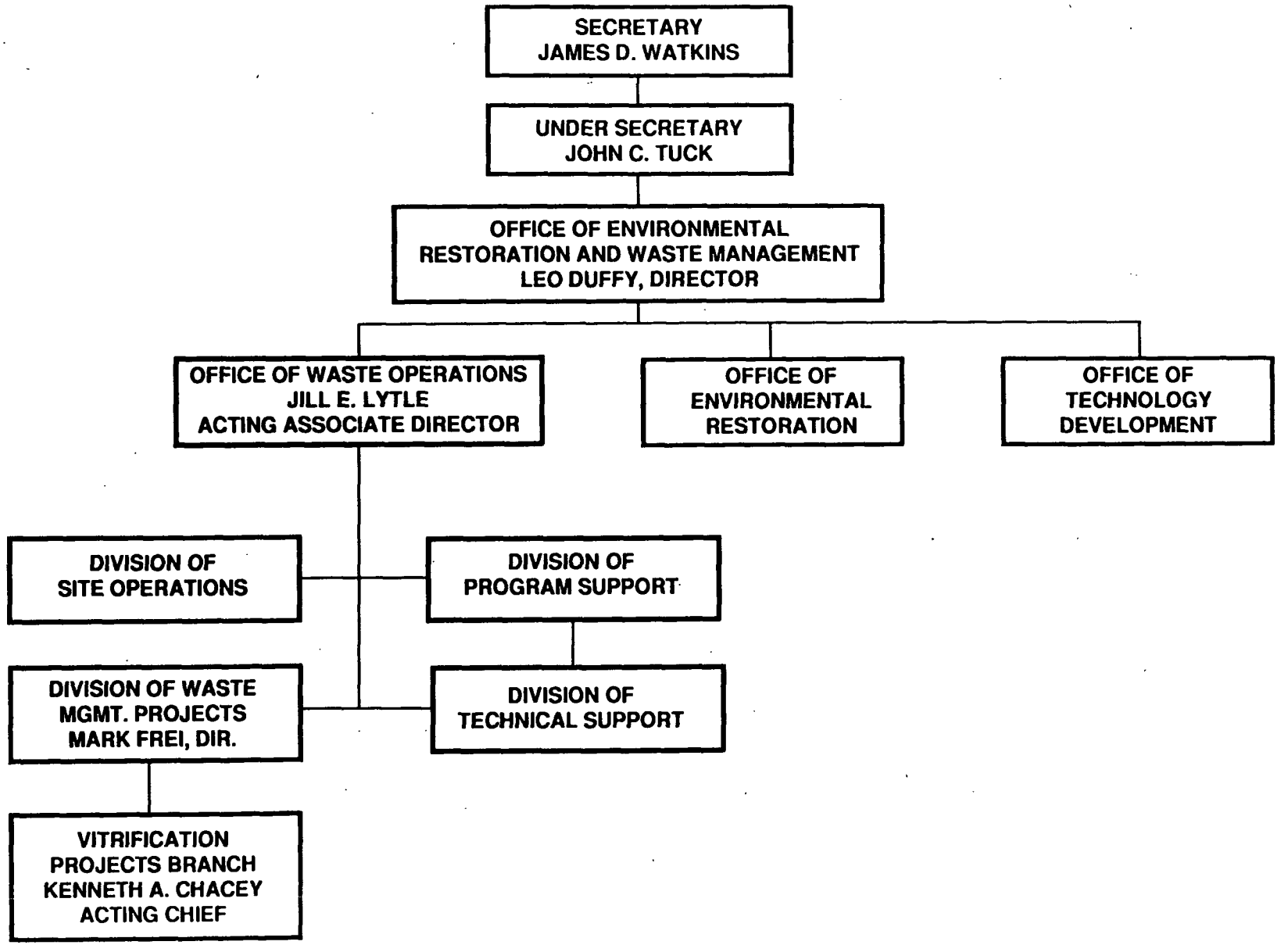


VITRIFICATION PROGRAM/PROJECT OBJECTIVES

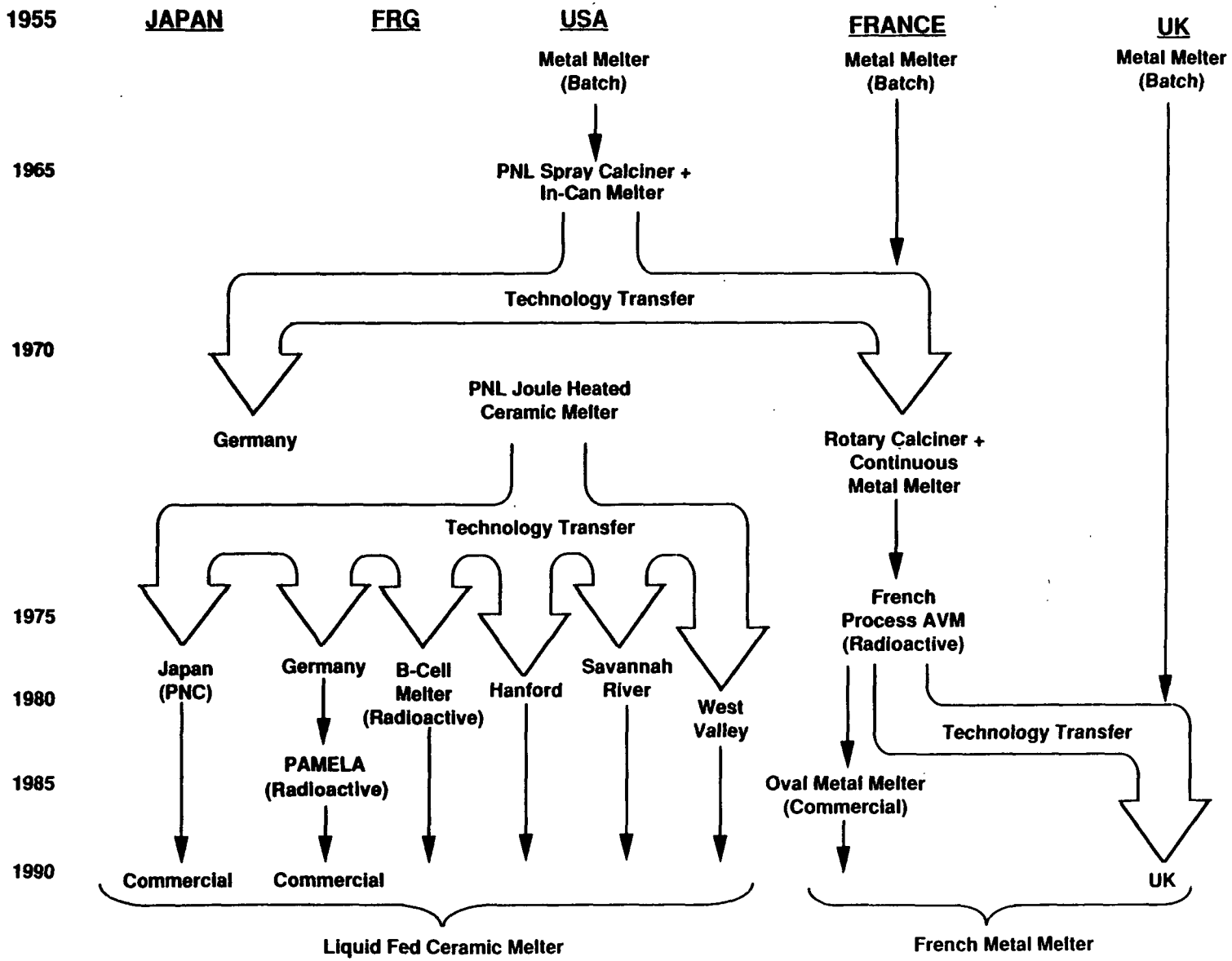
- **PROGRAM OBJECTIVES:**
  TO DEVELOP, DEMONSTRATE AND IMPLEMENT TECHNOLOGY FOR THE LONG-TERM MANAGEMENT OF HIGH-LEVEL NUCLEAR WASTE

- **PROJECT OBJECTIVES:**
  TO DESIGN, CONSTRUCT AND OPERATE FACILITIES TO IMMOBILIZE HIGH-LEVEL NUCLEAR WASTE FOR STORAGE, TRANSPORTATION TO AND SUBSEQUENT DISPOSAL IN A FEDERAL GEOLOGIC REPOSITORY

VITRIFICATION PROGRAM/PROJECT QUALITY ASSURANCE GOALS

- ACHIEVE A HIGH LEVEL OF QUALITY IN ALL HLW ACTIVITIES
- OPERATE IN A WAY THAT COMPLIES WITH FEDERAL REGULATIONS AND REQUIREMENTS
- PROTECT THE ENVIRONMENT AND THE HEALTH AND SAFETY OF DOE EMPLOYEES, DOE CONTRACTORS AND THE GENERAL PUBLIC
- OPERATE IN A WAY THAT INSTILLS CONFIDENCE IN OUR ABILITY TO OPERATE SAFELY AND RELIABLY

SCHEMATIC HISTORY OF HIGH-LEVEL WASTE GLASS DEVELOPMENT



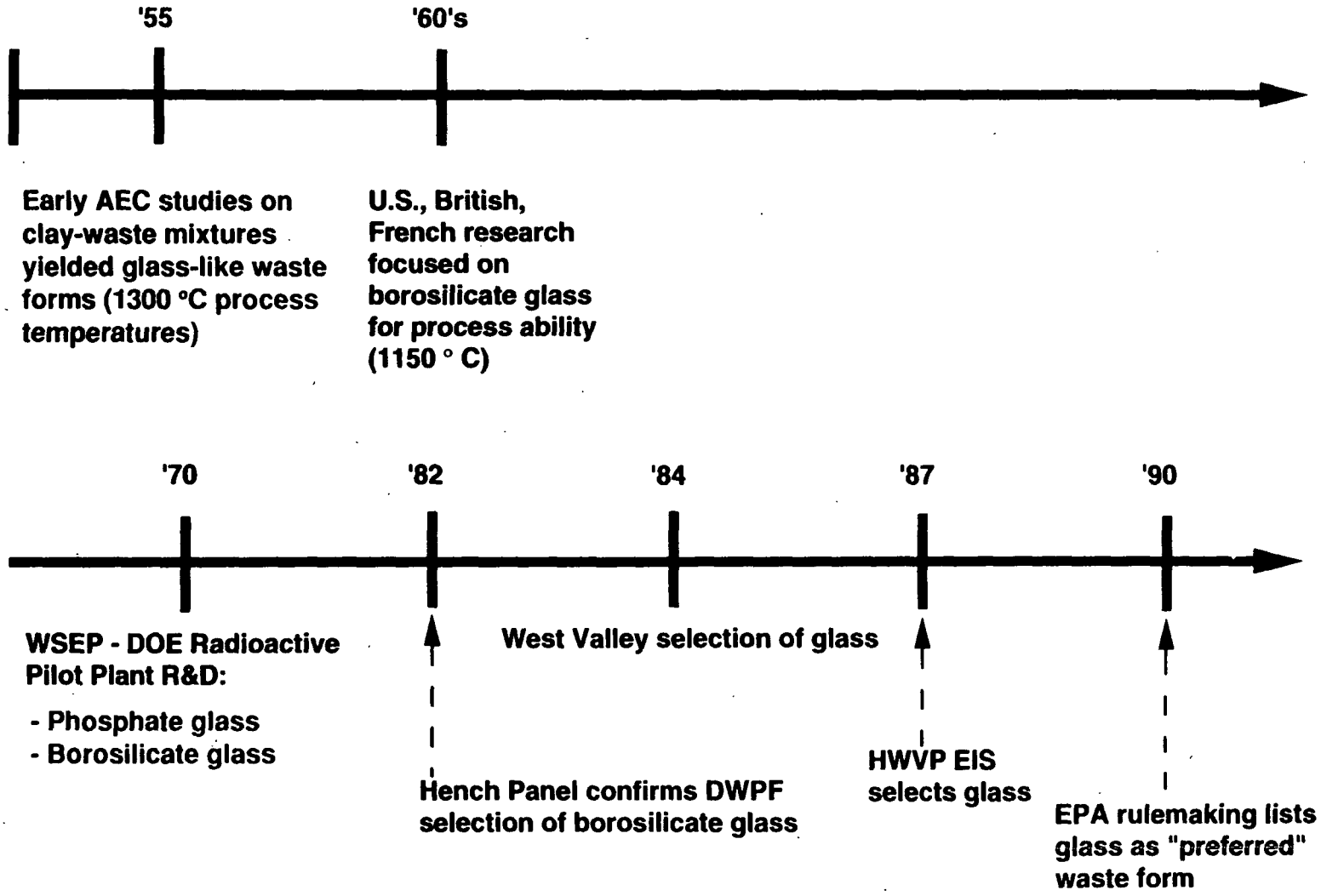
LIQUID FED CERAMIC MELTER (LFCM) SELECTION CHRONOLOGY

- DWPF SELECTS LFCM TECHNOLOGY - 1980
- WVNS ASSESSES USE OF AVM (ATELIERS de VITRIFICATION de MARCOULE) vs. LFCM FOR VITRIFYING WVDP WASTES - 1982
- DOE PANEL ENDORSES LFCM TECHNOLOGY FOR WEST VALLEY DEMONSTRATION PROJECT (WVDP) - 1983

FACTORS SUPPORTING LFCM TECHNOLOGY SELECTION

- HIGHER CAPACITY
- LONGER UNIT LIFE
- DEMONSTRATED COMPATABILITY WITH SLURRY FEEDS (NEUTRALIZED FEED RATHER THAN ACID FEEDS)
- GREATER INDUSTRY ACCEPTANCE
- POTENTIAL PROCESSING AND MAINTENANCE SIMPLIFICATION
- DEMONSTRATED WASTE FORM QUALITY RELATIVE TO U.S. REGULATORY REQUIREMENTS

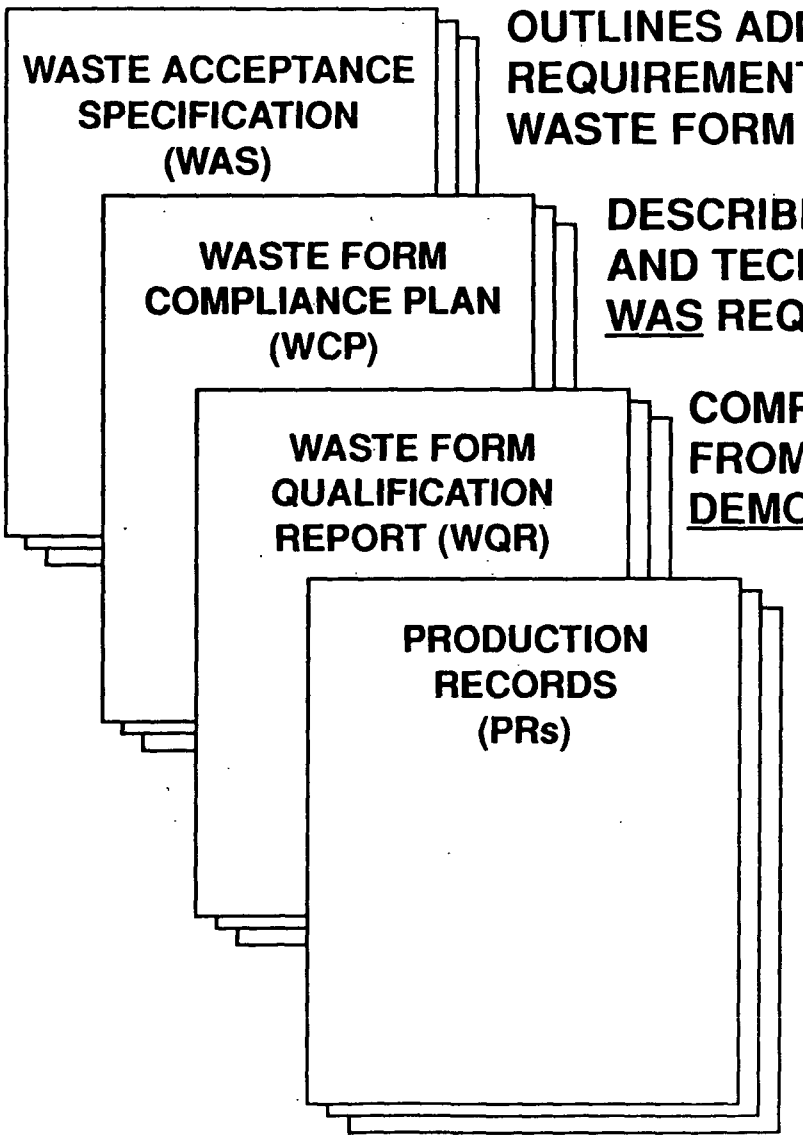
BOROSILICATE GLASS - THE "PREFERRED" HIGH-LEVEL RADIOACTIVE WASTE FORM



HLW GLASS PRODUCERS STRATEGY

- RECEIVE A PRODUCT ACCEPTANCE SPECIFICATION FROM RW
- ESTABLISH A PLAN FOR MEETING THE SPECIFICATION
- QUALIFY THE PRODUCT AND THE PRODUCTION PROCESS
- PRODUCE AND CERTIFY EACH PRODUCT UNIT

HLW GLASS PRODUCERS IMPLEMENTATION PROCESS



OUTLINES ADMINISTRATIVE AND TECHNICAL REQUIREMENTS THAT EACH CANISTERED WASTE FORM MUST MEET

DESCRIBES THE PROCESSES, SYSTEMS, AND TECHNIQUES THAT ENSURE THAT WAS REQUIREMENTS ARE MET

COMPILES THE INFORMATION AND DATA FROM WCP IMPLEMENTATION THAT DEMONSTRATE COMPLIANCE WITH WAS

DOCUMENTS PRODUCTION OF EACH CANISTERED WASTE FORM

WILL ACCOMPANY EACH UNIT WHEN TURNED OVER TO THE REPOSITORY

WASTE ACCEPTANCE PROCESS HISTORY

- SAVANNAH RIVER ESTABLISHED INTERSITE COORDINATION GROUP - 1970s
- WASTE ACCEPTANCE COMMITTEE (WAC) SUPERCEDED INTERSITE COORDINATION GROUP IN OCTOBER 1984
- INTERIM, DRAFT, GENERIC WASTE ACCEPTANCE REQUIREMENTS ISSUED JANUARY 1985. DRAFT, GENERIC WASTE ACCEPTANCE REQUIREMENTS REVISED JANUARY 1989
- WASTE ACCEPTANCE PROCESS DEFINED BY DOE JULY 1985

WASTE ACCEPTANCE PROCESS HISTORY

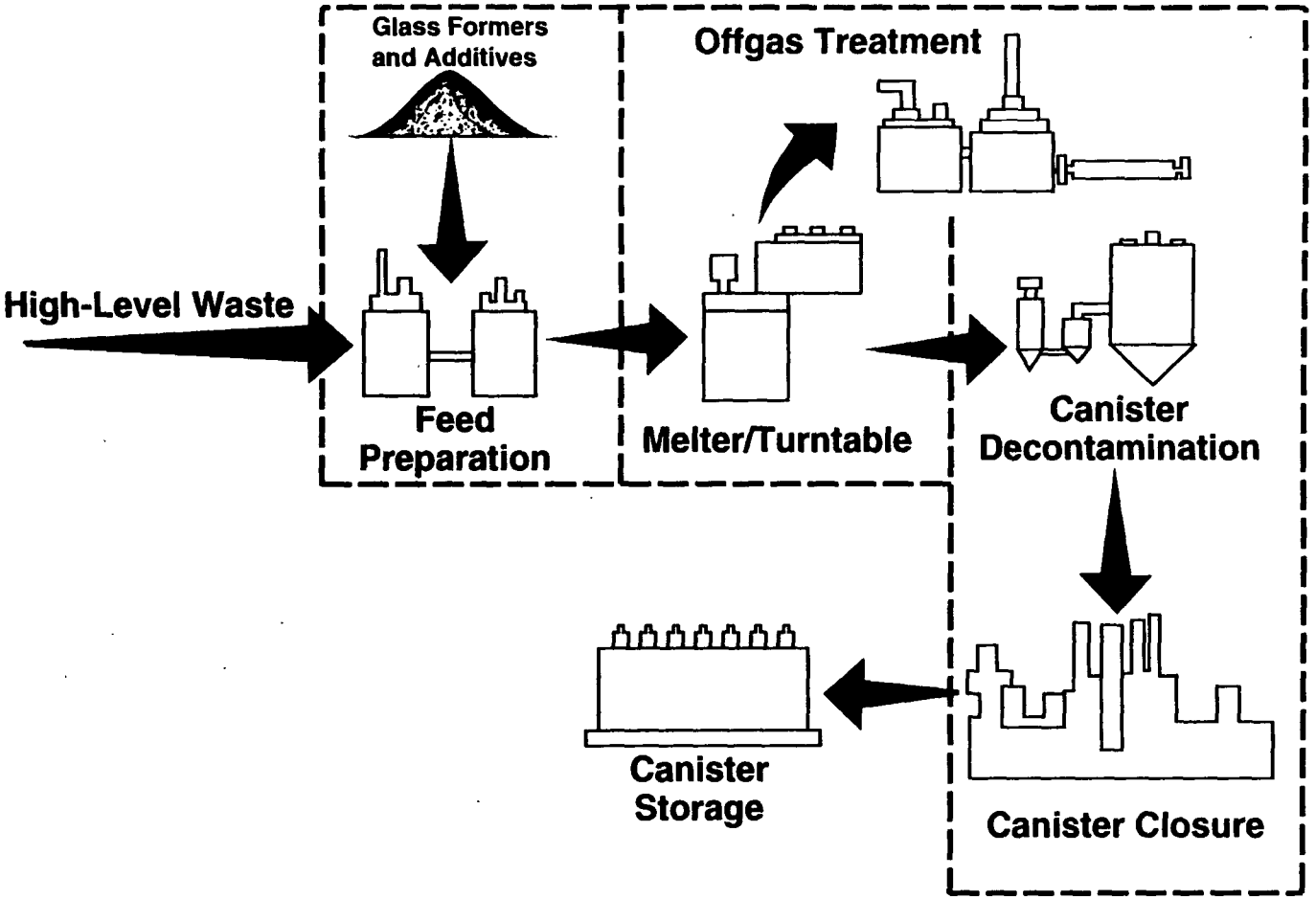
(CONTINUED)

- FIRST DRAFT WASTE ACCEPTANCE PRELIMINARY SPECIFICATIONS (WAPS) FOR THE DWPF RELEASED IN DECEMBER 1986 (DRAFT FOR CONCURRENCE, REV. 1 - APRIL 1988)

- WAPS FOR WVDP ISSUED - FEBRUARY 1987

- DWPF WASTE FORM QUALIFICATION REPORT (WQR) TECHNICAL REVIEW GROUP KICK-OFF MEETING - MAY 1989

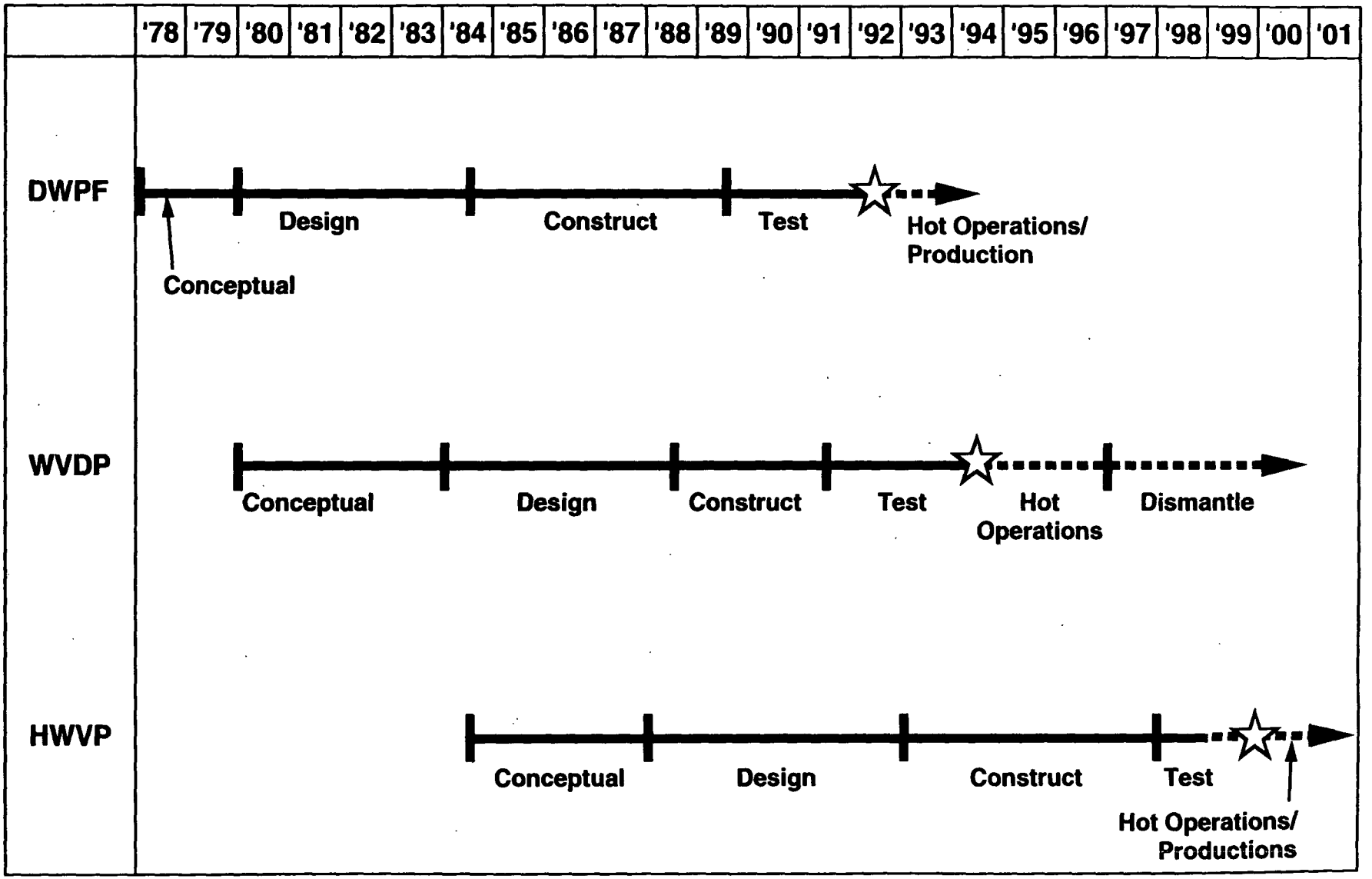
VITRIFICATION PROCESS FLOW DIAGRAM



SUMMARY OF HLW CANISTER QUANTITIES AND PHYSICAL CHARACTERISTICS

	West Valley Demonstration Project	Savannah River Plant	Hanford
Projected Number of Canisters (2020)	300	5750	1960
Outside Diameter (cm)	61	61	61
Overall Height (cm)	300	300	300
Material	Stainless Steel	Stainless Steel	Stainless Steel
Wall Thickness (cm)	0.34	1.0	1.0
Weight (kg)			
Canister (empty)	252	450	450
Glass	1895	1700	1650
Total	2147	2150	2100
Maximum KCi per Canister	96.6	230	400
Maximum Watts per Canister	289	670	1158

PROJECT/PROGRAM SCHEDULES



CONCLUSIONS

- PROVEN PROCESS
- EPA PREFERRED WASTE FORM
- AGGRESSIVE, LOGICAL SCHEDULES
- COMPREHENSIVE REQUIREMENTS OF WAPS
- NUCLEAR GRADE QUALITY ASSURANCE
- MANAGEMENT INTERFACES WELL DEFINED
- FORMAL, PERMANENT RECORDS ESTABLISHED