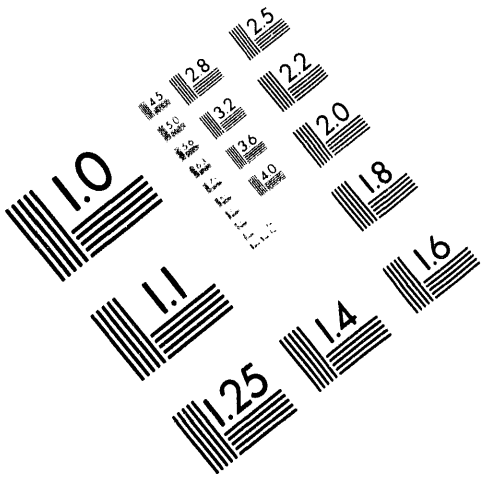

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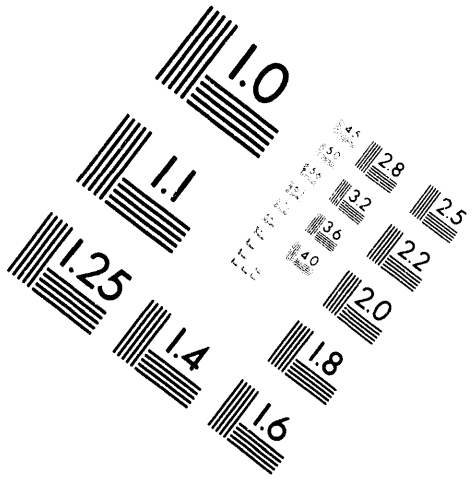

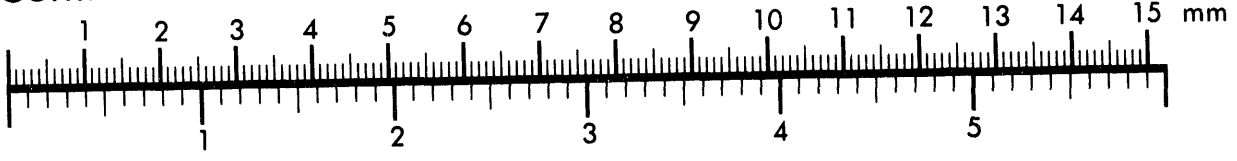

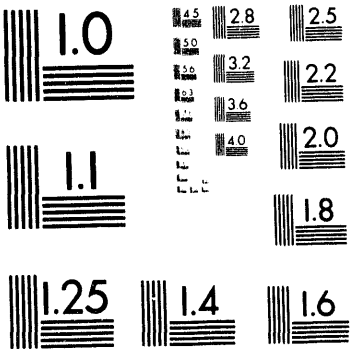

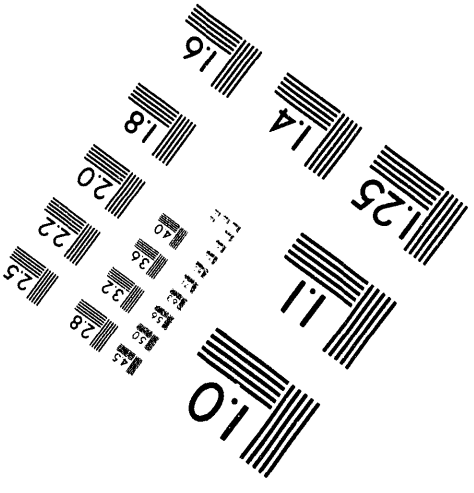

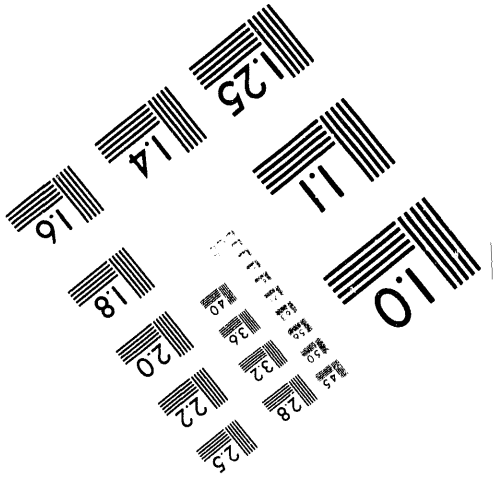

1 of 1

WHC-EP-0733
Revision 1

High-Level Waste Tank Remediation Technology Integration Summary

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WHC Information Release Administration Specialist:

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A-6001-400 (07/94) WEF256

HIGH LEVEL WASTE TANK REMEDIATION TECHNOLOGY INTEGRATION SUMMARY

ABSTRACT

The U. S. Department of Energy's Environmental Restoration and Waste Management and Technology Development Programs are engaged in a number of projects to develop, demonstrate, test, and evaluate new technologies to support the cleanup and site remediation of more than 300 underground storage tanks containing over 381,000 m^3 (100 million gal) of liquid radioactive mixed waste. Significant development is needed within primary functions and in determining an overall bounding strategy. This document is an update of continuing work to summarize the overall strategy and to provide data regarding technology development activities within the strategy. It is intended to serve as an information resource to support understanding, decision making, and integration of multiple program technology development activities. Recipients are encouraged to provide comments and input to the authors for incorporation in future revisions.

CONTENTS

HIGH LEVEL WASTE TANK REMEDIATION TECHNOLOGY INTEGRATION SUMMARY 1

APPENDICES

A HIGH LEVEL WASTE TANK REMEDIATION TECHNOLOGY DEVELOPMENT ACTIVITIES CHART A-1

B UST-ID TECHNOLOGY INTEGRATION SYSTEM SOFTWARE AND USER GUIDE B-1

HIGH LEVEL WASTE TANK REMEDIATION TECHNOLOGY INTEGRATION SUMMARY

This document presents the results of ongoing efforts within the Department of Energy's (DOE) Underground Storage Tank - Integrated Demonstration (UST-ID) program to facilitate an integrated approach in developing emerging technologies needed for tank waste remediation. The UST-ID is conducting a number of technology development projects aimed at tank waste remediation at five UST-ID participating sites: Hanford, Savannah River, Idaho National Engineering Laboratory (INEL), Oak Ridge, and Fernald (Ohio).

Production of nuclear materials has been a major mission of DOE and its predecessor agencies for the last 50 years. These activities have contributed to a substantial accumulation of hazardous, radioactive, and mixed wastes at a number of sites. One of DOE's most significant challenges will be remediating the more than 300 underground storage tanks and associated near-field environments at the participant sites. DOE has made a commitment to remediate the tank sites that are not in compliance with state and federal regulations and to treat and dispose of the wastes in accordance with accepted practice. This remediation program will constitute one of the most complex and resource-intensive cleanup actions ever attempted by a government agency.

The cost of cleanup of the tank sites will be prohibitive using some of the current baseline technologies. Furthermore, major gaps exist in key technology areas. New and improved technologies are needed that will support the baseline strategies, reduce costs, accelerate clean-up, and enhance safety. Accordingly, DOE's Waste Management (EM-30), Environmental Restoration (EM-40), and Technology Development (EM-50) Programs are engaged in a number of projects to develop, demonstrate, test, and evaluate new technologies to support the tank waste cleanup mission.

The EM-30 Program at each site has the responsibility to safely store and proceed to treat and dispose of existing and new wastes in a manner that is environmentally sound, technically correct, safe to workers and the public, cost-effective, and in full compliance with applicable laws, regulations, and DOE Orders. To support these remediation objectives, EM-30 must develop the baseline strategy for retrieval, treatment, and disposal, and ensure that the needed technologies are developed.

The EM-40 Program at each site has a similar mission with the responsibility to clean up and restore sites and facilities that are no longer in service. As with the EM-30 Program, all activities must be performed in a manner that is environmentally sound, technically correct, safe to workers and the public, cost-effective, and in full compliance with applicable laws, regulations, and DOE Orders.

The EM-50 Program is pursuing technology development activities at multiple national laboratories and with multiple management/operating contractors to support the site remediation efforts. The UST-ID technology

development activities are focused on two major elements: the Characterization and Retrieval Program and the Waste Processing and Disposal Program. In addition, the UST-ID works with the various EM-50 Research and Development Programs to help transition emerging technologies to a stage where they are ready for demonstration. Programs include Characterization, Monitoring and Sensors Technology - Integrated Program, Robotics - Integrated Program, Efficient Separations and Processing - Integrated Program, and In Situ Remediation - Integrated Program. The UST-ID also maintains awareness of progress in other integrated demonstrations with technologies that may have related application in tank waste remediation.

Appendix A to this document presents the "High Level Waste Tank Remediation Technology Development Activities" chart, which shows the EM-30, EM-40, and EM-50 technology development activities arranged by major processing functions in the current baseline strategy. The chart is intended as a visual tool to aid in determining applicability of technologies and the relative emphasis placed on the various functional needs.

Appendix B provides the initial version of the "UST-ID Technology Integration System," an EXCEL^{R}-based computer program that presents the data from the chart and other related technology development information. The program provides an opening "top-level" flow diagram that allows the user to access more detailed levels of information with simple mouse commands. Instructions are provided for loading the program onto a personal computer and for operating it. Investigations are underway regarding loading the program onto one of several "on-line" data communication networks to allow access on a real-time basis.

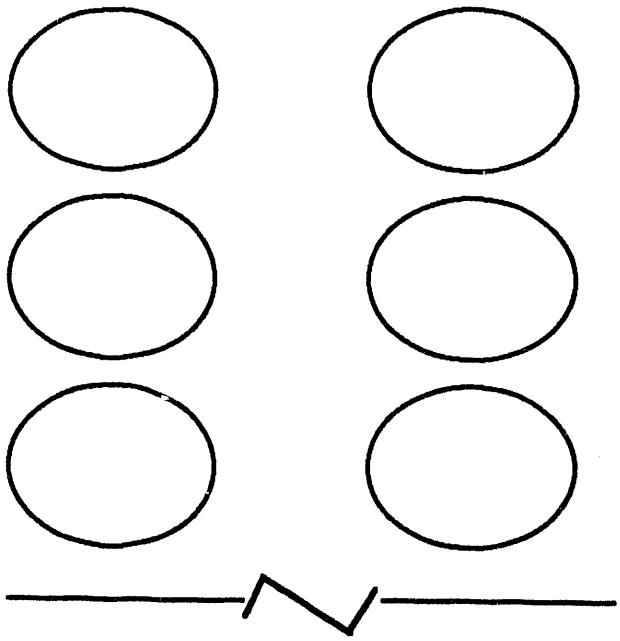
The current vision for this activity is to transition it to the proposed High-Level Waste Tanks Focus Group for continued use and development. The next revision is tentatively planned for December 1994. Recipients are encouraged to review both the chart and the program and to provide any input and comments to the authors.

The work reflected in this document was performed as part of the UST-ID, in Technical Task Plan RL421207, under the direction of the DOE, Richland Operations Office, and the DOE-Headquarters, Office of Technology Development.

APPENDIX A

HIGH LEVEL WASTE TANK REMEDIATION TECHNOLOGY DEVELOPMENT ACTIVITIES CHART

Single-Shell Tanks



Site	No. Tanks	Total Waste (Mgal)
Hanford	149	36.6
Fernald	4	2.8
INEL	11	2.3
SRS	8	2.1
OR	91	0.8

SST Tank Waste Retrieval

Hydraulic Sluicing

SST Retrieval Projects
EM-30, TWRS
WHC — Henders

C-106 Retrieval, W320
EM-30, TWRS
WHC — Henders
WHC — Bail

Enhanced Sluicing
EM-30, TWRS
WHC — TE

Double-Shell Tanks

DST Tank Waste Retrieval

Mixer Pumps/Transfer Systems

DST Retrieval Projects

nk Waste Retrieval

aulic Sluicing

ST Retrieval Projects
M-30, TWRS
/HC — Henderson

-106 Retrieval, W320
M-30, TWRS
/HC — Henderson
/HC — Bailey

nhanced Sluicing
M-30, TWRS
VHC — TBD

Robotic/Mechanical

SST Retrieval Projects
EM-30, TWRS
WHC — Henderson

C-106 Retrieval, W340
EM-30, TWRS
WHC — Henderson
WHC — McDaniel

SST Training and Testing Facility
EM-30, TWRS
WHC — Shen

Robotic/2nd Generation Arm
EM-50, Robotics-IP
PNL — Bennett
ORNL — Hamel
PNL — Evans
SNL — Horschel
METC — Beddick
SNL — Harrigan

Robotics - Cross Cut
EM-50, Robotics-IP
PNL — Evans
LANL — Hollen
SNL — Harrigan

D&D Robotics
EM-50, Robotics-IP
PNL — Stoughton

Dislodging & Conveyance M
EM-50, UST-ID
PNL
UofM
WSU

Dislodging & Conveyance S
EM-50, UST-ID
PNL

Dislodging & Conveyance S
EM-50, UST-ID
WHC

High Pressure Jet
EM-50, UST-ID
Quest

Medium Pressure System/M
EM-50, UST-ID
UofM

Integrated Testing
EM-50, UST-ID
PNL

Simulant Development
EM-50, UST-ID
PNL
BNFL

Cooperative Telerobotic Re
EM-50, BWID
INEL

Tank Waste Retrieval

ixer Pumps/Transfer Systems

DST Retrieval Projects

Robotic/Mechanical

Robotic/2nd Generation Arm
EM-50, Robotics-IP
PNL — Bennett

Cooperative Telerobotic F
EM-50, BWID
INEL

slodging & Conveyance Mechanics
A-50, UST-ID
IL — Ban rger
fM — Summers
SU — Crowe

slodging & Conveyance Systems
A-50, UST-ID
NL — Rinker

slodging & Conveyance Systems
A-50, UST-ID
HC — Mullen

igh Pressure Jet
M-50, UST-ID
uest — Coleman

edium Pressure System/Mining
M-50, UST-ID
ofM — Summers

tegrated Testing
M-50, UST-ID
NL — Hathchell

imulant Development
M-50, UST-ID
NL — Golcar
NFL — Snedeker

ooperative Telerobotic Retrieval
M-50, BWID
IEL — Griebenow

SST Leakage Mitigation

Subsurface Barriers Program
EM-30, TWRS
WHC — Bazinett
WHC — Hampsten

Subsurface Barrier Feasibility; TPA
M-45-07A, -07B
EM-30, TWRS
WHC — Cruse
Enserch, Bovay

Demonstration Test Planing & Procurement (on hold)
Test Site Preparations (on hold)
EM-30, TWRS
WHC — Hampsten

UST-ID Interface
EM-50, UST-ID
WHC — Cruse

Sonic Drilling/Technology
EM-50, VOC-ID
WHC — McLellan
WSRC — Wise

Soil Saw Demonstration
EM-50, ISR-IP/VOC
NUS — Saugier

Continuous Air Barrier
EM-50, METC
K&M, BDM — Crocker

ISR-IP Interface
EM-50, ISR-IP
PNL — Peterson

Viscous Liquids
EM-50, ISR-IP
LBL — Pruess

Hydraulic & Diffusion Barriers
EM-50, ISR-IP
BNL — Heiser

Flowable Grout Barriers
EM-50, ISR-IP
Golder/MIBRAG — Voss
Golder/Hoechst — Voss
SNL — Rea

Chemically Enhanced Barriers
EM-50, ISR-IP
PNL — Cantrell

Cryocell Technology
EM-50, ISR-IP
ORNL — Swatzell

Cryogenics Containment
EM-50, ISR-IP
BNL — Schweissing

Horizontal Grout Barriers
EM-50, ISR-IP
BNL — Ridenour

S

A

Peterson

Pruess

rs

Heiser

Voss
Voss
Rea

ners

Cantrell

Swatzell

Schweissing

Ridenour

SST Leak Detection & Monitoring

SST Leak Detection & Monitoring
EM-30, TWRS
WHC — Propson
WHC — Iwatate

Electical Resistance Tomography
EM-50, UST-ID
WHC — Eberlein
LLNL — Daily

Electrical Resistance Tomography
EM-50, CMST-IP
LLNL — Daily
LLNL — Ramirez

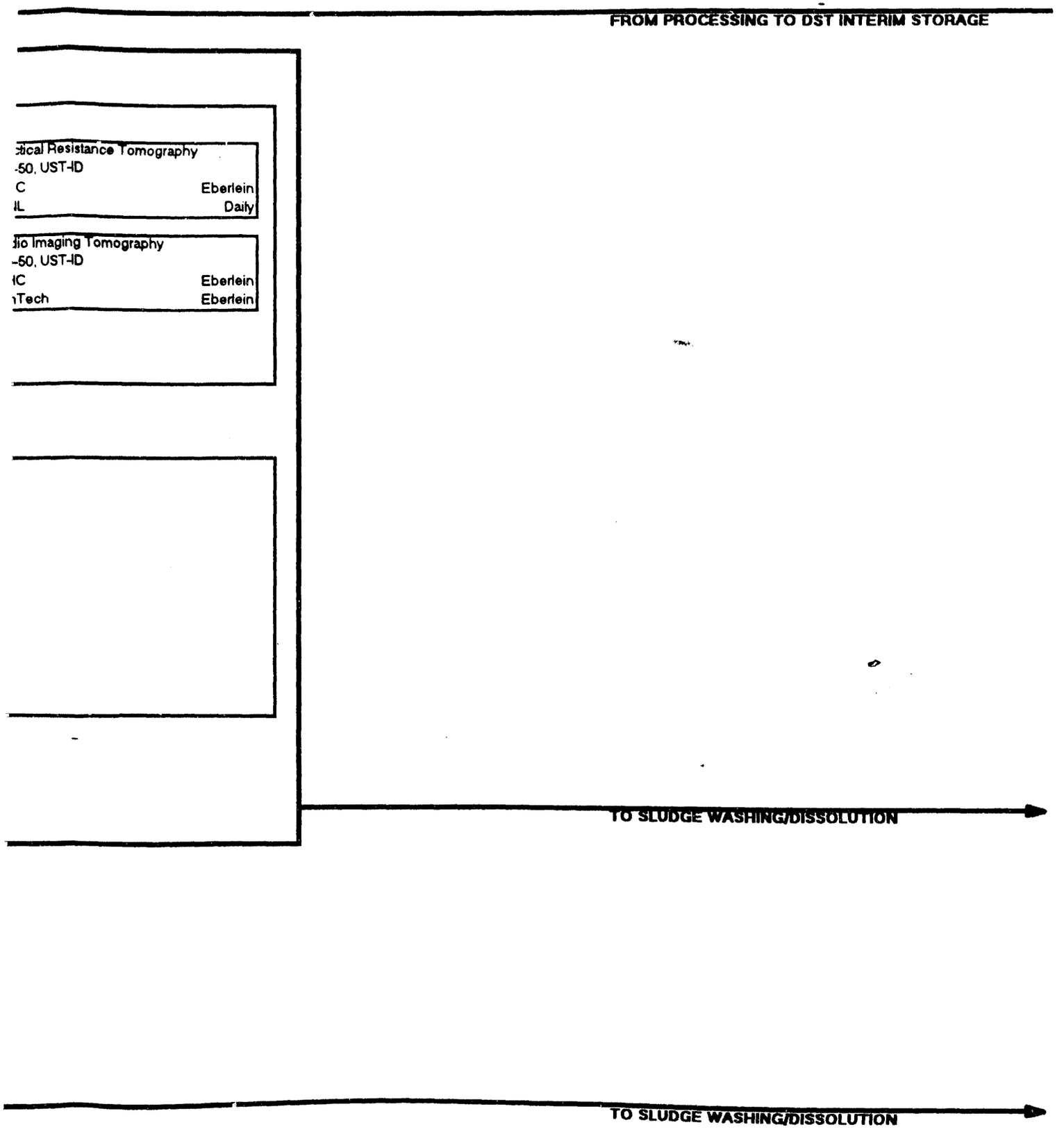
Radio Imaging Tomography
EM-50, UST-ID
WHC — Eberlein
RimTech — Eberlein

Alternative Retrieval Methods

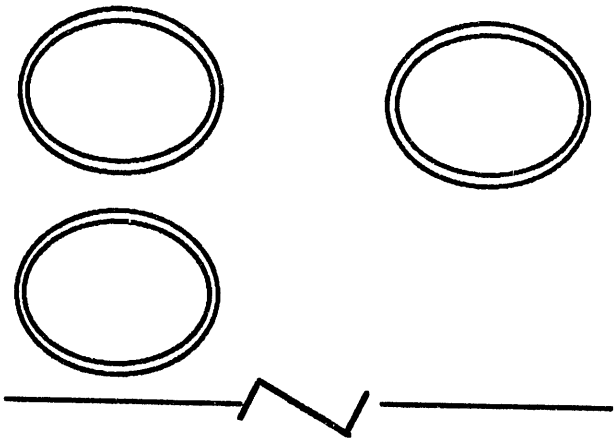
Alternative Retrieval
EM-30, TWRS
WHC — Mahaffey

Cryogenic Cutting System
EM-50, BWID
INEL — Bingham

Figure A-1. High Level Waste Tank Technology Development Activities (Sheet 1 of 2)



Double-Shell Tanks



Site	No. Tanks	Total Waste (Mgal)
Hanford	28	24.4
SRS	43	31.9

DST Tank Waste Retrieval

Mixer Pumps/Transfer Systems

DST Retrieval Projects
EM-30, TWRS
WHC — Bazinet

AZ-101 Retrieval, W151
EM-30, TWRS
WHC — Bazinet

DST Retrieval, W211
EM-30, TWRS
WHC — Bazinet

Characterization

Internal Tank Mapping

In Situ Viscometer
EM-30, TWRS
PNL — Colson

Phase Change Calibration Probe
EM-30, TWRS
PNL — Antoniak

Acoustic Imaging
EM-30, TWRS
WHC — Mech

Tank Leak Detection & Monitoring

Measurement While Drilling
EM-50, MWL-ID
SNL — Floran

Sonic Drilling Technology
EM-50, VOC-ID
WHC — McLellan
WSRC — Wise

Design and Evaluation
EM-50, VOC-ID
PNL — Roberson

ste Retrieval

ps/Transfer Systems

eval Projects
/RS
Bazinet

etrieval, W151
/RS
Bazinet

eval, W211
/RS
Bazinet

Robotic/Mechanical

Robotic/2nd Generation Arm
EM-50, Robotics-IP
PNL — Bennett
ORNL — Hamel
PNL — Evans
SNL — Horschel
METC — Beddick
SNL — Harrigan

Robotics - Cross Cut
EM-50, Robotics-IP
PNL — Evans
LANL — Hollen
SNL — Harrigan

D&D Robotics
EM-50, Robotics-IP
PNL — Stoughton

Cooperative Telerobotic Retrieval
EM-50, BWID
INEL — Grieb
INEL — Bin

en

k Mapping

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/RS
Colson

nge Calibration Probe
/RS
Antoniak

aging
/RS
Mech

In Situ Rheology
EM-30, TWRS
PNL — Shepard

Interface Detection - T/D Reflectometry
EM-50, CMST-IP
WSRC — Tilley

Acoustic Characterization
EM-50, CMST-IP
Ames — Martin

etection & Monitoring

ent While Drilling
/L-ID
Floran

g/Technology
C-ID
McLellan
Wise

Evaluation
C-ID
Roberson

Electrical Resistance Tomography
EM-50, CMST-IP
LLNL — Daily
LLNL — Ramirez

In-Situ Characterization & Sampling

Light Duty Utility Arm
EM-30, TWRS
WHC — Propson
WHC — Smith

LDUA Sensors
EM-30, TWRS
WHC
WHC

Light Duty Utility Arm
EM-30, ORNL
MMES/OR

Light Duty Utility Arm
EM-30, INEL
WINCO

Light Duty Utility Arm (LDUA) Systems
EM-50, UST-ID
WHC — Carteret
Spar — Cunliffe
PNL — Smith
ORNL — Burks
WSRC — Heckendorn
WINCO — Griebenow
SNL — Spietzer

Sensing Head Space Gases
EM-50, CMST-IP
Ames — Bastiaans

TRU & Moisture Measurement
EM-50, CMST-IP
PNL — Brodsinski

Electromagnetic Moisture Measureme
EM-50, CMST-IP
PNL — Ho

Cone Penetrometer - In Situ Char
EM-30, TWRS
WHC — Bu

Cone Penetrometer - In Situ Char
EM-50, CMST-IP
WHC — Bu

Cooperative Telerobotic Retrieval
EM-50, BWID
INEL Griebenow
INEL Bingham

Electromagnetic Moisture Measurement
EM-50, CMST-IP
PNL Hockey

Cone Penetrometer - In Situ Char
EM-30, TWRS
WHC Bunes

Cone Penetrometer - In Situ Char
EM-50, CMST-IP
WHC Bunes

In-Situ Characterization & Sampling (Cont'd)

In Situ Core Bit Instrumentation
EM-30, TWRS
WHC Winkelman
SNL Kadlec

SY-101 Void Fraction Measurement
EM-30, TWRS
LANL Edwards
PNL Colson

FECN Surface Moisture Measurement
EM-30, TWRS
WHC Winkleman

Copper Foil Activation Moisture Meas.
EM-30, TWRS
PNL Brodzinski

Imaging through Obscuration
EM-50, CMST-IP
PNL Peters

Field/Laboratory/Hot Cell Characterization

Raman Field Test Facility
EM-30, TWRS
WHC

Hot Cell Screening System
EM-30, TWRS
WHC

Rapid Chemical Characterization
EM-50, CMST-IP
ORNL Jenkins

RCRA Metals by Laser Induced Spec
EM-50, CMST-IP
LANL Koskelo

Infrared Analysis
EM-50, CMST-IP
Ames McClelland

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Brodzinski

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Peters

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Jenkins

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Koskelo

McClelland

Field/Laboratory/Hot Cell Characterizaion (Cont'd)

Analytical Technology Development: Raman Spect., Infrared Spec., Laser Ablation, Rheology, Gamma Energy, Complexants, Thermal Conductivity, Heat Cap., Hot Cell Extraction, Physical Properties/Abrasivity, ICP/MS, Micro-wave Digestion, Total Cyanide, Salt Cake, Organic Sample Prep., Cyanide Speciation, XAFS Waste Speciation, Acoustic Imaging, Lab. Waste Volume Reduction
EM-30, TWRS

WHC	Winkelman
WHC	Riech
PNL	Hartman
LANL	Villarreal
PNL	Shepard
WHC	Keele
PNL	Tingey
PNL	Ballou
WHC	Dodd
WHC	Bechtold
PNL	Stromatt
PNL	Smith
PNL	Baldwin
WHC	Hiller
WHC	Prilucik
WHC	Wehner
WHC	Rebagay
SNL	Kadlec
PNL	Blanchard
WHC	Mech

Characterization Systems
EM-50, UST-ID
WHC — Eberlein

Raman & IR Spectroscopy
EM-50, UST-ID
WHC — Reich

Advanced Fiber Optic Spectroscopy
EM-50, UST-ID
LLNL — Kyle

Fiber Optic Process
EM-50, UST-ID
WSRC — O'Rourke

Acoustic Emission Method
EM-50, UST-ID
ORNL — Pepper

Laser Ablation Mass Spec.
EM-50, CMST-IP
PNL — Colson

Gamma Effects on Fiber Optic
EM-50, CMST-IP
LANL — Donohoe

Contaminant Analysis Automation
EM-50, Robts-IP

PNL	Dodson
SNL	Harrigan
INEL	Wilding
ORNL	Hamel
LANL	Hollen

Process Monitoring, Characterizatio

Tc Removal - Mass Spec. Anal.
EM-30, TWRS
LANL — Nog

Tank Vapor Flow Monitor
EM-30, TWRS
ORNL — Jenki

Representative Sample Retrieval

Sludge Recovery Improvement
EM-30, TWRS
WHC — Fran

Pilot Scale Retrieval
EM-30, TWRS
WHC — Blo

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acterization (Cont'd)

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Tingey
Ballou
Dodd
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tromatt
Smith
aldwin
Hiller
Prilucik
Vehner
obagay
Kadlec
nchard
Mech

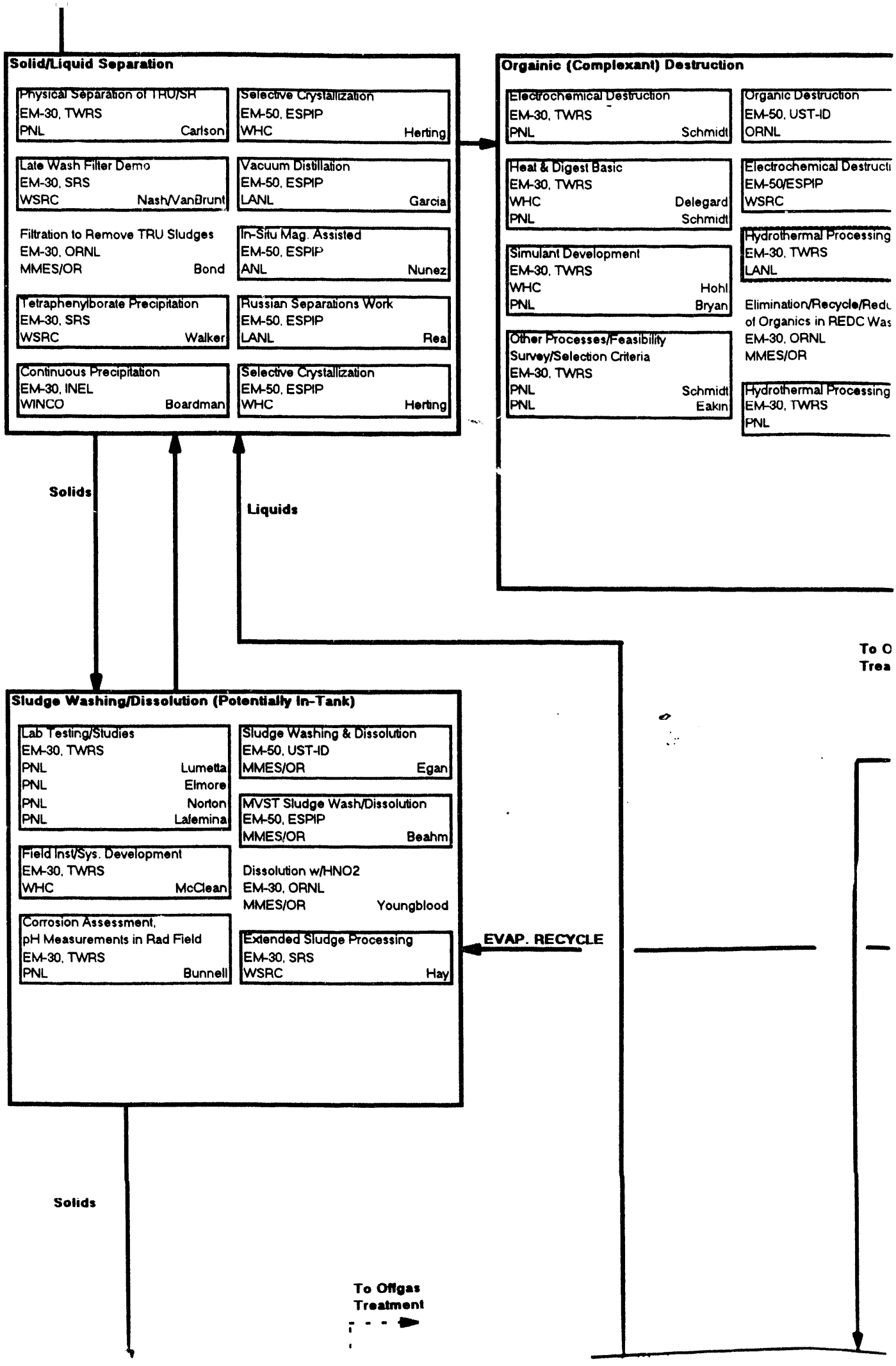
Characterization Systems EM-50, UST-ID WHC	Eberlein
Raman & IR Spectroscopy EM-50, UST-ID WHC	Reich
Advanced Fiber Optic Spectroscopy EM-50, UST-ID LLNL	Kyle
Fiber Optic Process EM-50, UST-ID WSRC	O'Rourke
Acoustic Emission Method EM-50, UST-ID ORNL	Pepper
Laser Ablation Mass Spec. EM-50, CMST-IP PNL	Colson
Gamma Effects on Fiber Optic EM-50, CMST-IP LANL	Donohoe
Contaminant Analysis Automation EM-50, Robts-IP PNL SNL INEL ORNL LANL	 Dodson Harrigan Wilding Hamel Hollen

Process Monitoring, Characterization

Tc Removal - Mass Spec. Anal. EM-30, TWRS LANL	Nogar
Tank Vapor Flow Monitor EM-30, TWRS ORNL	Jenkins
On-line Process Monitoring EM-50, UST-ID WHC	Mech
Continuous NH3 Monitoring -> EM-50, MW-IP SNL	Ottesen
Airborne Alpha - R/T Monitoring EM-50, MW-IP LANL	Gritzo

Representative Sample Retrieval

Sludge Recovery Improvement EM-30, TWRS WHC	Francis
Pilot Scale Retrieval EM-30, TWRS WHC	Bloom


Solid/Liquid Separation
Physical Separation of TRU/SR
EM-30, TWRS
PNL Carlson
Selective Crystallization
EM-50, ESPIP
WHC Herting
Late Wash Filter Demo
EM-30, SRS
WSRC Nash/VanBrunt
Vacuum Distillation
EM-50, ESPIP
LANL Garcia
Filtration to Remove TRU Sludges
EM-30, ORNL
MMES/OR Bond
In-Situ Mag. Assisted
EM-50, ESPIP
ANL Nunez
Tetraphenylborate Precipitation
EM-30, SRS
WSRC Walker
Russian Separations Work
EM-50, ESPIP
LANL Rea
Continuous Precipitation
EM-30, INEL
WINCO Boardman
Selective Crystallization
EM-50, ESPIP
WHC Herting
Orgainic (Complexant) Destruction
Electrochemical Destruction
EM-30, TWRS
PNL Schmidt
Organic Destruction
EM-50, UST-ID
ORNL
Heat & Digest Basic
EM-30, TWRS
WHC Delegard
PNL Schmidt
Electrochemical Destructi
EM-50/ESPIP
WSRC
Hydrothermal Processing
EM-30, TWRS
LANL
Simulant Development
EM-30, TWRS
WHC Hohl
PNL Bryan
Elimination/Recycle/Redu
of Organics in REDC Was
EM-30, ORNL
MMES/OR
Other Processes/Feasibility
Survey/Selection Criteria
EM-30, TWRS
PNL Schmidt
PNL Eakin
Hydrothermal Processing
EM-30, TWRS
PNL
Solids
Liquids
To O
Trea
Sludge Washing/Dissolution (Potentially In-Tank)
Lab Testing/Studies
EM-30, TWRS
PNL Lumetta
PNL Elmore
PNL Norton
PNL Lafemina
Sludge Washing & Dissolution
EM-50, UST-ID
MMES/OR Egan
MVST Sludge Wash/Dissolution
EM-50, ESPIP
MMES/OR Beahm
Field Inst/Sys. Development
EM-30, TWRS
WHC McClean
Dissolution w/HNO2
EM-30, ORNL
MMES/OR Youngblood
Corrosion Assessment,
pH Measurements in Rad Field
EM-30, TWRS
PNL Bunnell
Extended Sludge Processing
EM-30, SRS
WSRC Hay
EVAP. RECYCLE
Solids
To Offgas
Treatment

Destruction
JST-ID
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ORNL
OR Bond

ermal Processing
TWRS
Schmidt

Cs Removal

IPA/Cs-IX CPU
EM-30, TWRS
PNL, WHC Gadd

Cs IX Development/Test
EM-30, TWRS
PNL Carlson
PNL Kurath
PNL Lafemina
PNL Bray

Electrochemical Cs IX
EM-30, TWRS
PNL Surma

Sorbents Scoping
EM-30/TWRS
LANL Marsh

Crystalline Silicotitanates
EM-30, TWRS
SNL Brown

Crystalline Silicotitanate IX
EM-50, ESPIP
SNL Brown

Inorganic IX - FeCN from
Highly Alkaline Waste/
Resorcinol for Cs - REDC Waste
EM-30, ORNL
MMES/OR Kent
MMES/OR Egan

CPU Development
EM-50, UST-ID
PNL Richmond

Cs Extraction Testing
EM-50, UST-ID
WSRC Bibler

SKID Test Unit
EM-50, UST-ID
WSRC Bibler

Cs Extraction Testing
EM-30, SRS
WSRC Bibler

Sludge/Supernate Process
Testing
EM-50, UST-ID
MMES/OR Egan

In-Situ Magnetically Assisted
EM-50, ESPIP
ANL Nunez

Develop and Test Sorbents
EM-50, ESPIP
PNL Wester

Carbollide/CDC Process
EM-50, SRS
WSRC McCabe

Sr/TRU Removal

Sr IX Materials/Separations
EM-30, TWRS
PNL Lafemir

Sr Precipitation Tests
EM-30, TWRS
WHC Hertir

Cation Exchange - IX Absorbers
EM-30, TWRS
LANL

TRU Removal by IX
EM-30, TWRS
LANL Yarb

Sr Removal - SrSpec(TM)
EM-30, INEL
WINCO Mill

Sr Removal by Coprecipitation/
Highly Alk. Waste
EM-30, ORNL
MMES/OR Ke

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Caustic Recycle

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EM-30, TWRS
WHC, PNL

Electrolysis Salt Splitting
EM-30, INEL
WINCO McCr

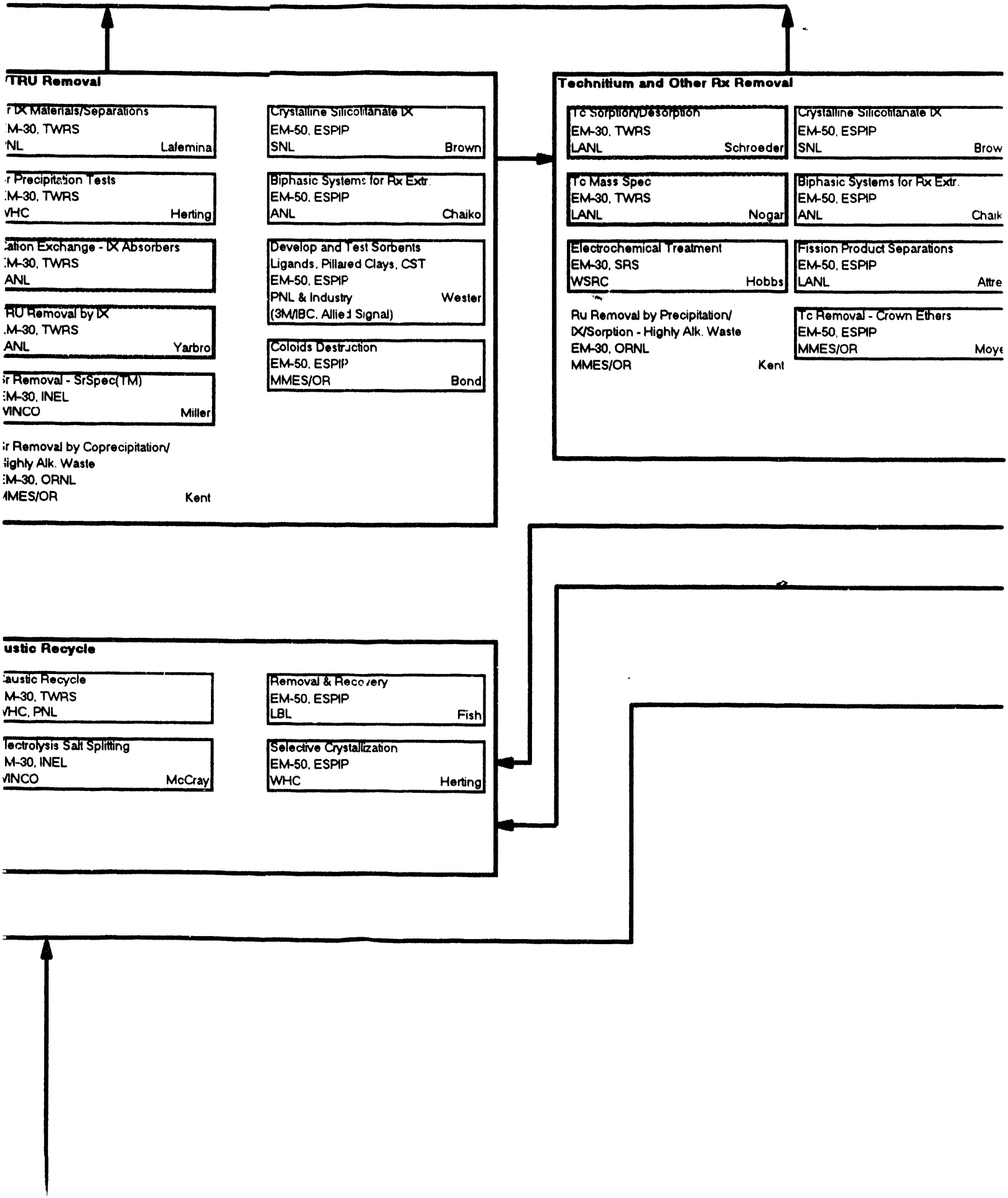
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Figure A-1. High Level Waste
Development Activities (Sheet 2

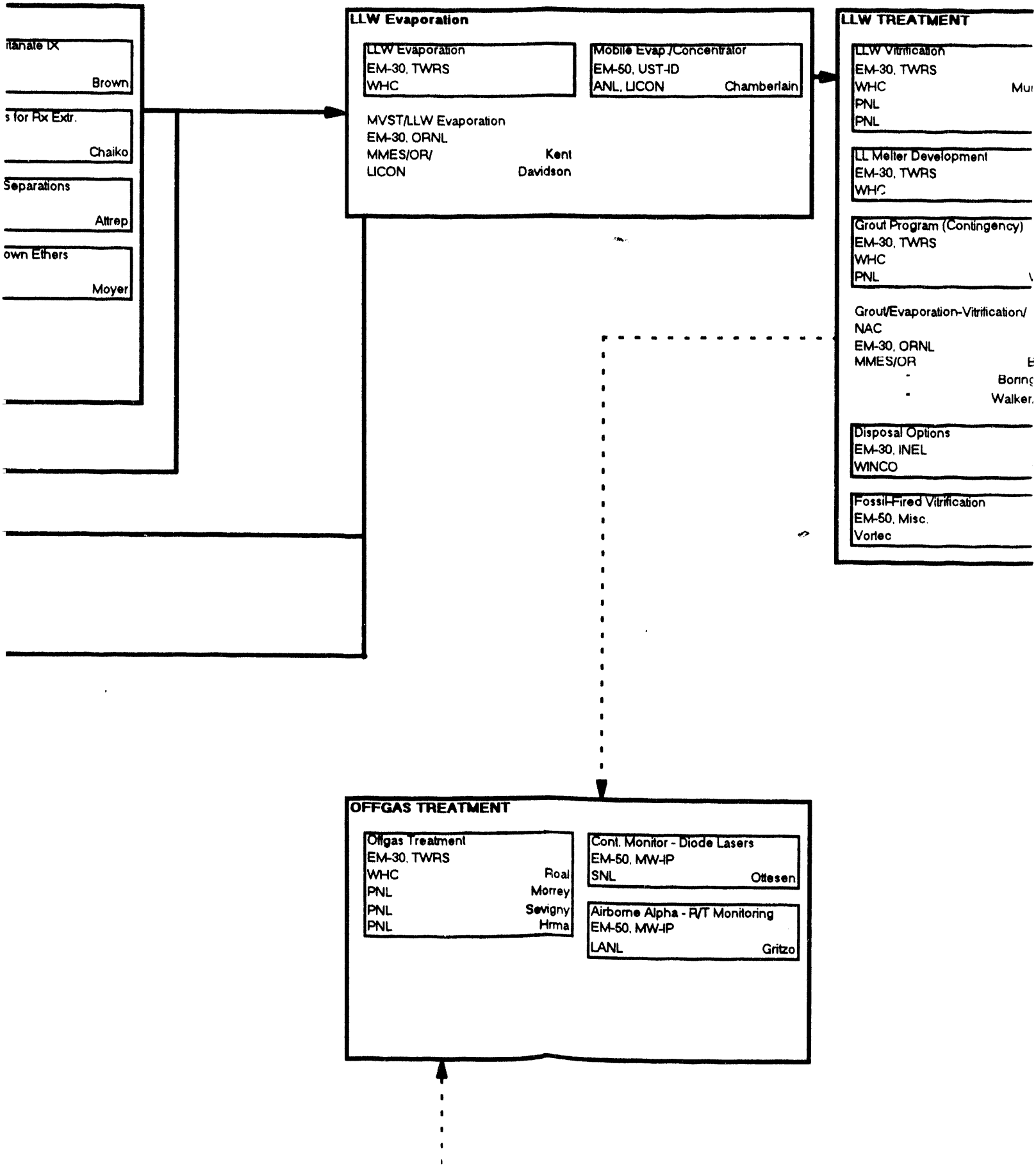
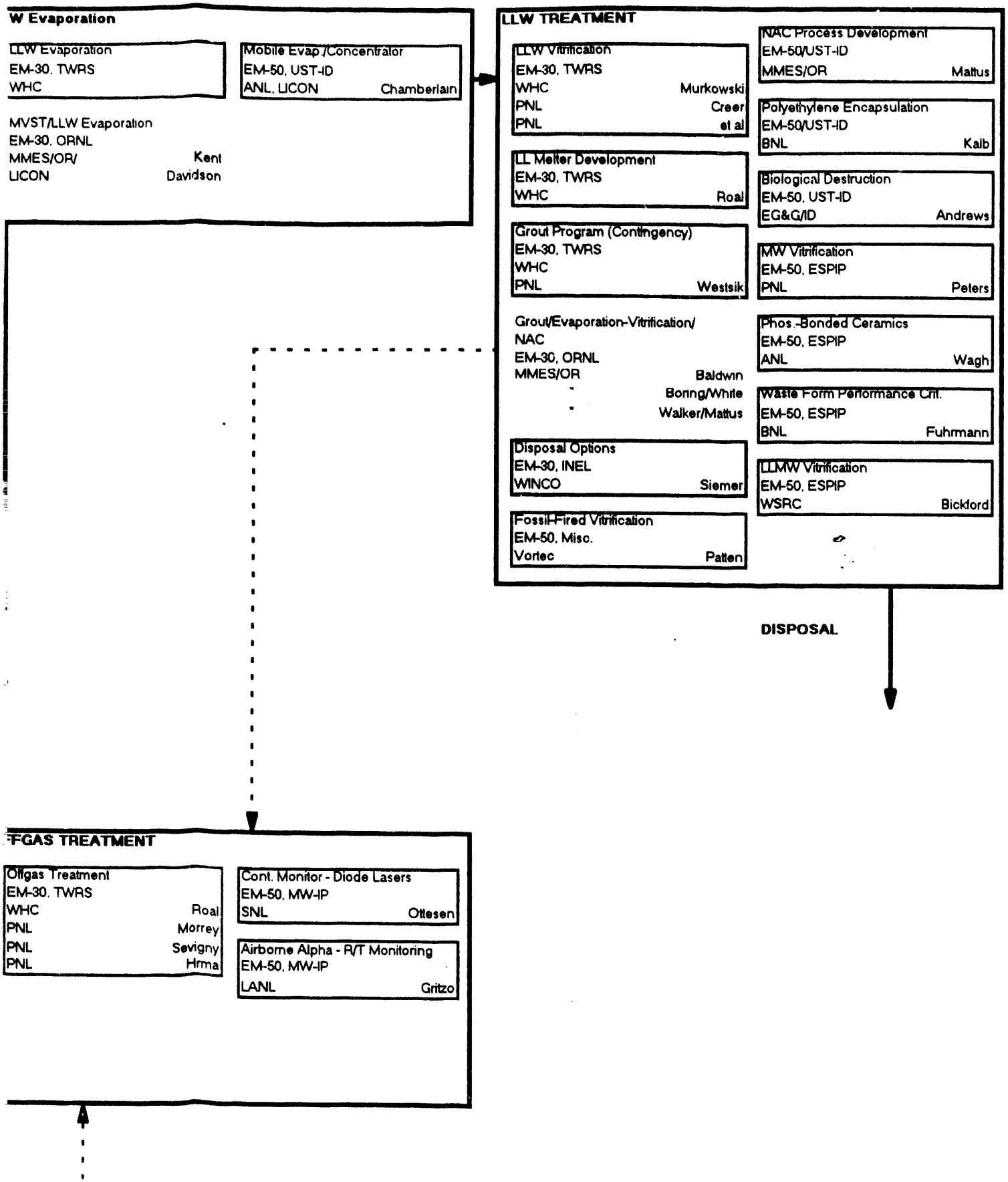


Figure A-1. High Level Waste Tank Technology Development Activities (Sheet 2 of 2)



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ANL Horwitz

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Precipitation
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Cs Removal - AMP; CST
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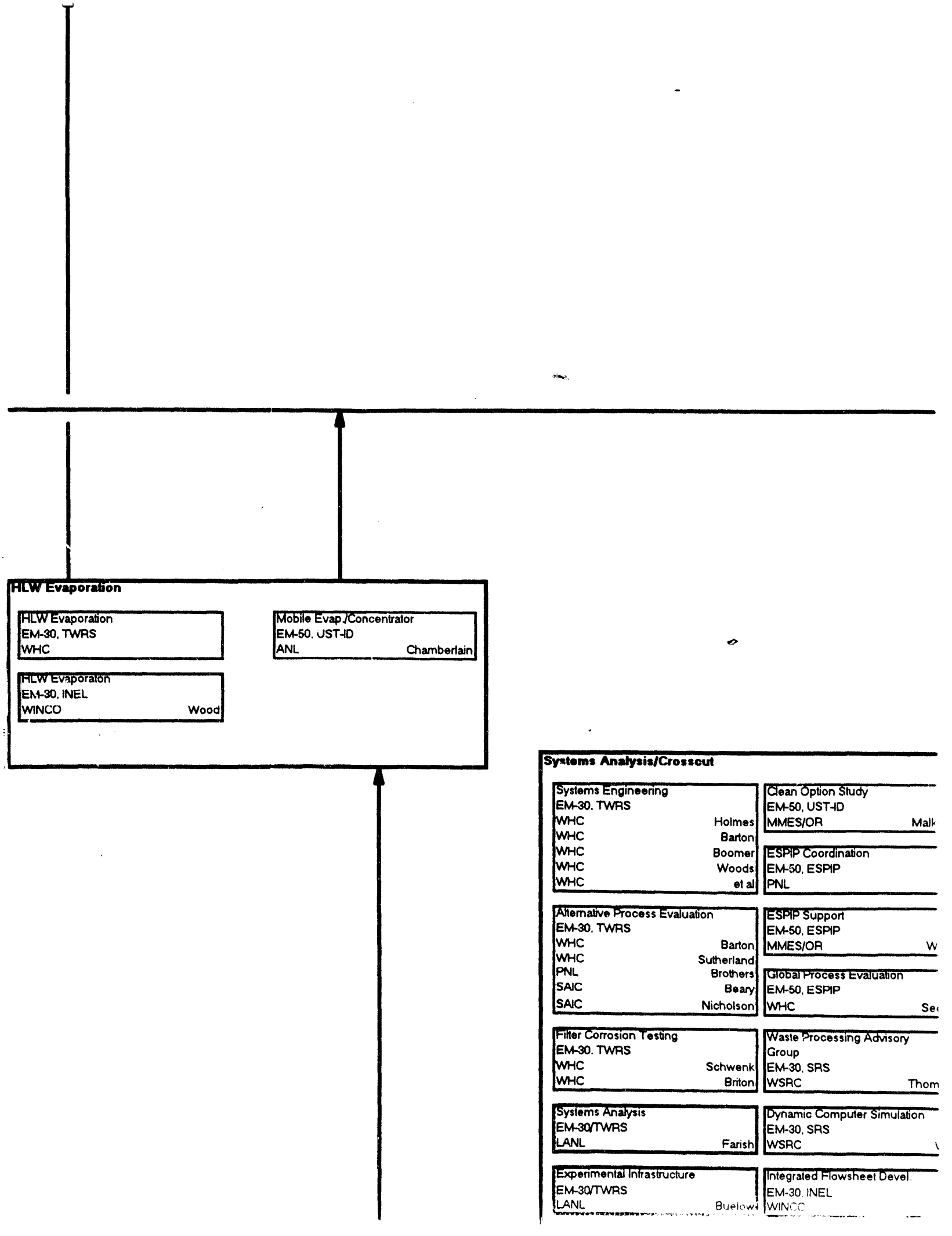
WINCO Miller

HLW Evaporation

HLW Evaporation
EM-30, TWRS
WHC

HLW Evaporation
EM-30, INEL
WINCO Wood


HLW Evaporation
HLW Evaporation
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HLW Evaporation
EM-30, INEL
WINCO Wood
Mobile Evap./Concentrator
EM-50, UST-ID
ANL Chamberlain
Systems Analysis/Crosscut
Systems Engineering
EM-30, TWRS
WHC Holmes
WHC Barton
WHC Boomer
WHC Woods
WHC et al
Clean Option Study
EM-50, UST-ID
MMES/OR Malk
ESPIP Coordination
EM-50, ESPIP
PNL
Alternative Process Evaluation
EM-30, TWRS
WHC Barton
WHC Sutherland
PNL Brothers
SAIC Beary
SAIC Nicholson
ESPIP Support
EM-50, ESPIP
MMES/OR W
Global Process Evaluation
EM-50, ESPIP
WHC Se
Filter Corrosion Testing
EM-30, TWRS
WHC Schwenk
WHC Briton
Waste Processing Advisory Group
EM-30, SRS
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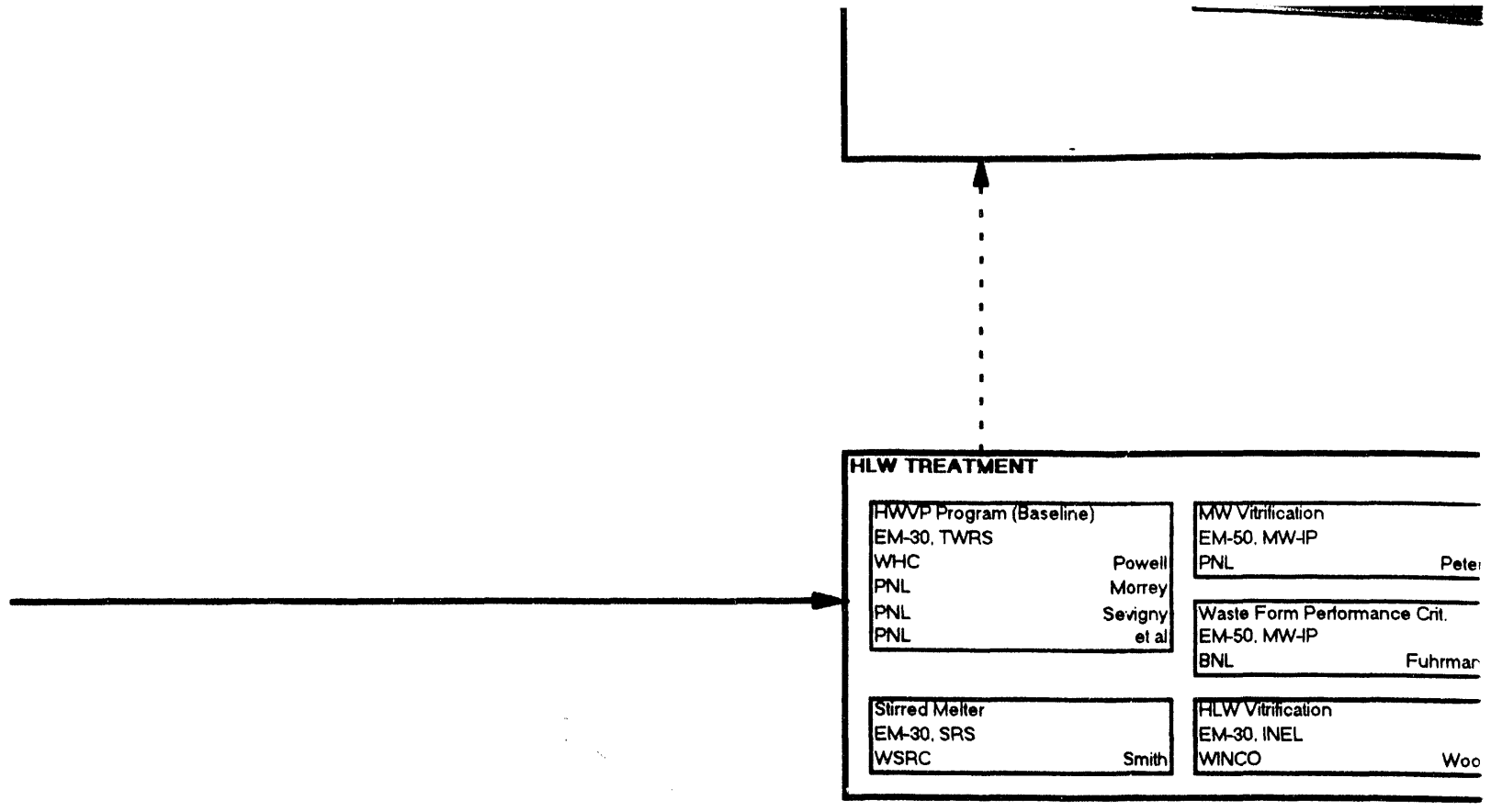

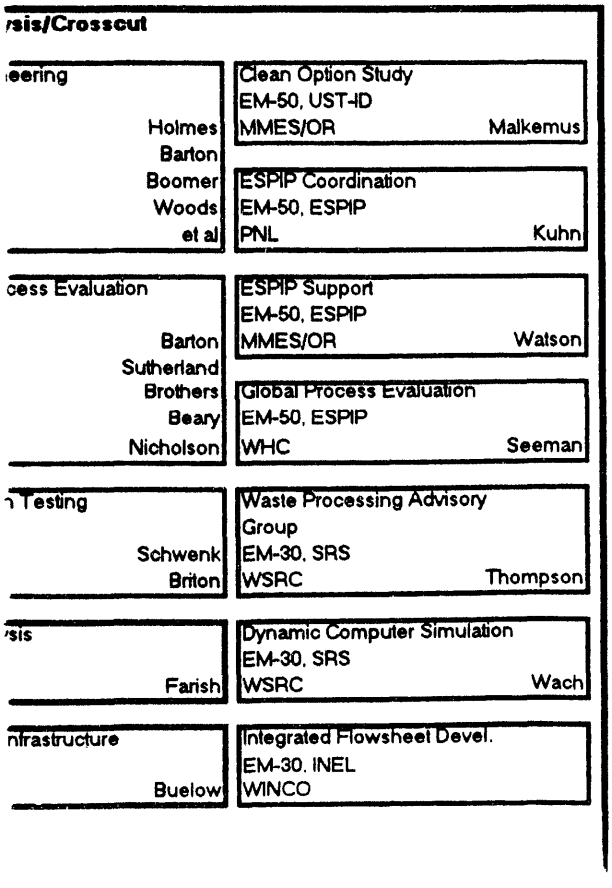

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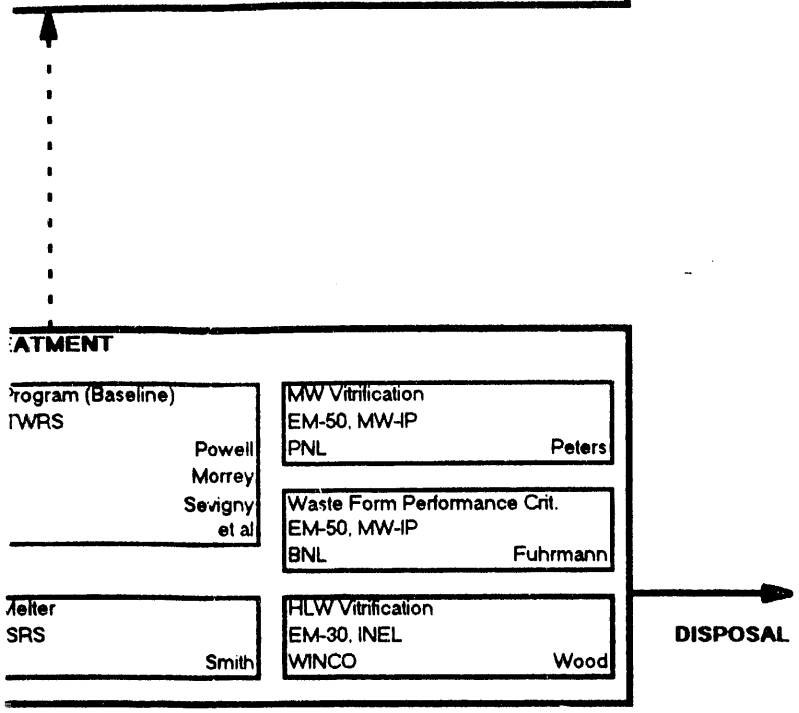
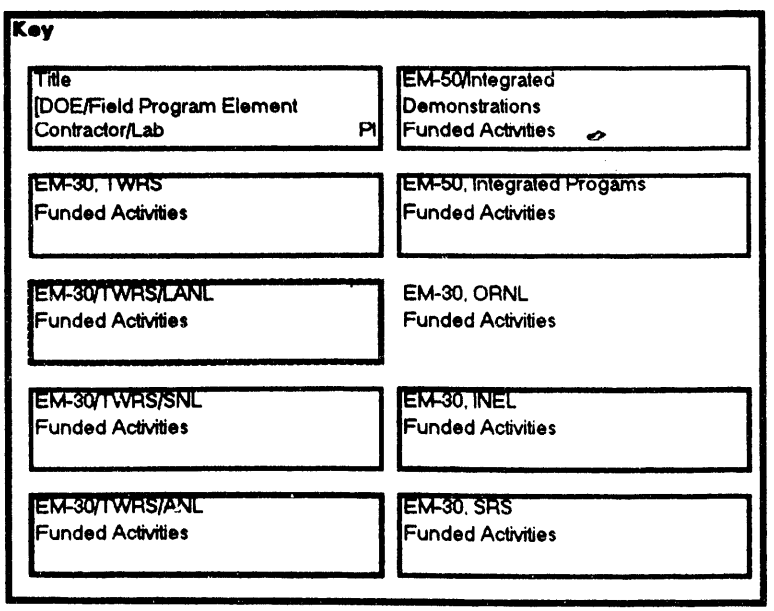




HIGH LEVEL WASTE TANK REMEDIATION TECHNOLOGY DEVELOPMENT ACTIVITIES

Compilation of EM-30, EM-40 and EM-50 Projects at Participating DOE Sites

June 15, 1994

Prepared by:
Underground Storage Tank-Integrated Demonstration
J. M. Cruse, WHC, 509-372-1024
K. M. Fowler, PNL, 509-372-4233

APPENDIX B

UST-ID TECHNOLOGY INTEGRATION SYSTEM SOFTWARE AND USER'S GUIDE

UST-ID TECHNOLOGY INTEGRATION SYSTEM
USER'S GUIDE

1.0 INTRODUCTION

The Underground Storage Tank - Integrated Demonstration (UST-ID) Technology Integration System (TIS) provides you with a computerized directory of the technologies being developed to support high-level waste tank remediation at multiple U.S. Department of Energy (DOE) sites. By using your mouse to click on a series of buttons, you can call up a complete flow diagram of a particular technology function, obtain general information about the function, and then find out which projects (technology development activities) are being conducted, along with information about the projects. Such a layered information system will enable you to obtain only as much information on a technology as you require. This program and guide assumes that you have a basic knowledge of computers and of Microsoft Windows.[1]

2.0 COMPUTER REQUIREMENTS

To run the UST-ID TIS program you need the following:

- IBM[2] or 100% IBM-compatible computer with 4 megabytes (MB) of random access memory (RAM) (for maximum efficiency in running the program, at least 6 MB of RAM is recommended)
- EGA/VGA monitor with a screen resolution of either 640 x 480 or 800 x 600 dots per inch
- A 3.5-in. high-density floppy disk drive
- At least 5 MB available for use on your hard drive
- Microsoft Windows (Version 3.1) and Microsoft Excel[3] (Version 4.0) installed on your hard drive (Excel Version 5.0 is NOT compatible with the UST-ID TIS program)
- A computer mouse compatible with Windows.

---

[1] Microsoft Windows is a trademark of Microsoft Corporation.

[2] IBM is a trademark of International Business Machines, Incorporated.

[3] Microsoft Excel is a trademark of Microsoft Corporation.

3.0 PROGRAM INSTALLATION

To install UST-ID TIS, follow these steps.

1. Insert the 3.5-in. installation disk into either your A or B drive.

2. If you inserted the disk in the A drive, type **A:** (or **B:** if the disk is in the B drive) and press **Enter**. Your screen should now show "A:."

3. At the A: prompt, type **install**. Your screen should show "A:install." Press **Enter**. The program is now being copied onto your hard drive (C drive) and placed in the *UST-ID-TIS Directory*. If this directory does not already exist, the installation program will automatically create it.

4.0 PROGRAM EXECUTION

Once you have installed the UST-ID TIS program on your hard drive, you can enter the program from either DOS or Windows. It is useful to note here that the UST-ID TIS program was written as an add-on application to Excel Version 4.0.

4.1 RUNNING THE PROGRAM FROM DOS

At the C:\UST-ID\TIS prompt, type **TIS** and press **Enter**. This will automatically take you into Excel for Windows and into the UST-ID TIS.

NOTE: You must first close out any startup program on your screen, such as E-mail, before you can get into Excel and the UST-ID TIS program.

4.2 RUNNING THE PROGRAM FROM WINDOWS

1. Once in Windows, double click on the Excel icon. This will open the Excel program.

2. Once in Excel, click on "Open" under the File menu. "Directories" will appear.

3. Double click on Directories to open the file, and then double click on "C:\" to open the directory for the C drive.

4. Scroll down and double click on "UST-ID." "TIS" will appear.

5. Double click on "TIS." "Files" will appear.

6. Under "Files," double click on "TIS.XLS."

5.0 PROGRAM FEATURES

The UST-ID TIS program was designed to be user friendly. Through Excel, you gain easy access to the program. The UST-ID TIS program then operates in an Excel workspace customized specifically for the program. Simply clicking on clearly labeled on-screen buttons within this customized framework will take you to any of the program functions. The special formatting features used to customize the Excel workspace and the on-screen buttons used throughout the program are described below.

5.1 CUSTOM FORMATTING

The Excel workspace has been modified only for use by the UST-ID TIS program. Modifications include removing the standard Excel menu bar, toolbars, formula bar, message bar, and scroll bars. The formatted workspace is shown in Figure B-1.

The UST-ID TIS program automatically fits all graphics to the screen size. To view diagrams in their entirety on screen without scrolling, a screen resolution dialog box appears (Figure B-1). It will ask you to select the current resolution of the computer screen. This will determine the relative size of the objects on screen. Only two computer screen choices are given: 640 x 480 dots per inch (standard resolution) or 800 x 600 dots per inch (high resolution). If you do not know the current resolution of your screen, you can find the information by activating Windows Setup from the Program Manager. If it shows a VGA display, the resolution of your screen is 640 x 480 dots per inch. VGA is the most common screen display and is the default display on most monitors. If it shows a different current screen resolution from the two choices listed above, you should change it so that the graphics can be viewed properly. To make the change, go to the Windows Setup under Program Manager and click on the "Options" menu. Within Options, click on "Change System Settings." Several options will appear including "Display." Click on "Display," then scroll down and click on "VGA."

Finally, all model elements are write protected. This means you cannot change any part of the program. This prevents you from accidentally causing UST-ID TIS errors.

5.2 ON-SCREEN BUTTONS

On-screen buttons control the entire UST-ID TIS program. You activate these buttons simply by clicking on them with the mouse. You will use most buttons to move from one technology diagram to another. These buttons have names corresponding to the diagram they activate. Other buttons perform functions such printing and exiting the program. These buttons also have corresponding names. The buttons available (shown in Figure B-2) are: "Technologies," "Technology Information," "Projects," "Next Level Up," "Previous," "Print," "Key," "OK," and "Quit." These buttons are described below.

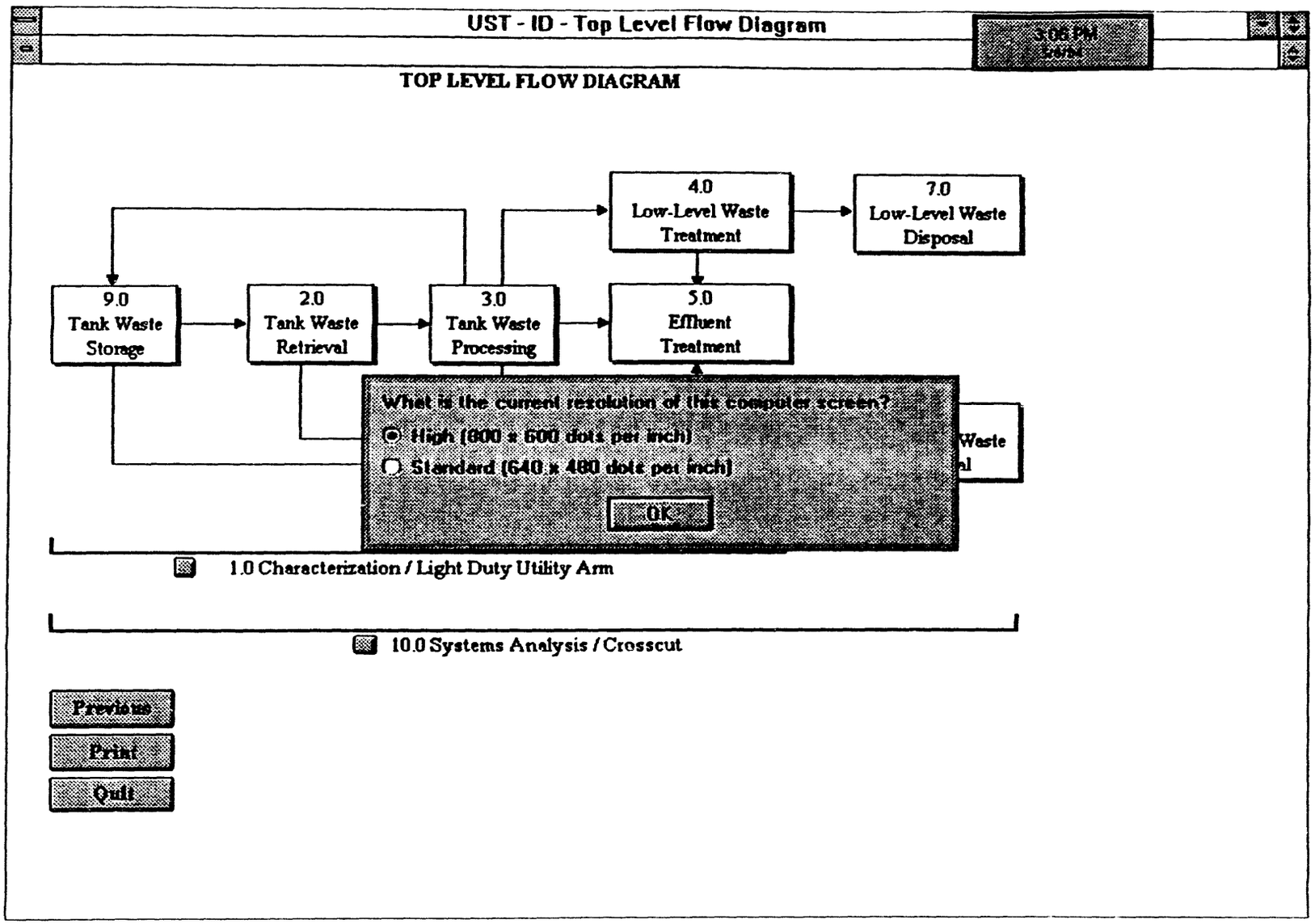
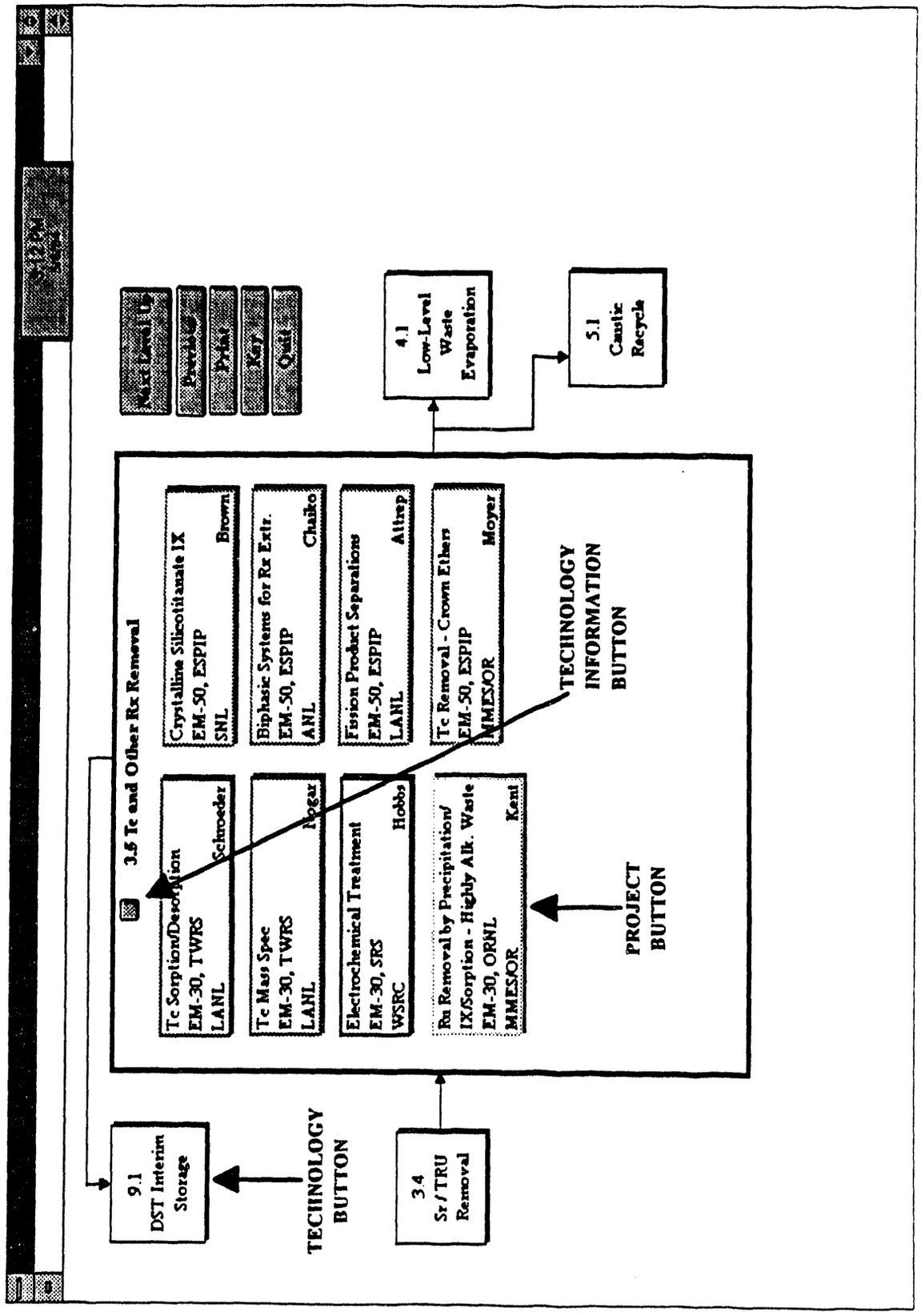


Figure B-1. Screen Resolution Dialog Box.

Figure B-2. On-screen Buttons Available for Program Use.



- Technologies

  Technology buttons represent the main categories and subcategories of technologies evaluated under the UST-ID program. A technology button activates the flow diagram corresponding to the given technology or subtechnology. The technology buttons are numbered in the order in which they are found on the top-level flow diagram, with subtechnologies numbered as a point extension of the parent technology. For example, tank waste processing is numbered 3.0, and organic destruction, a subtechnology of tank waste processing, is numbered 3.2.

- Technology Information

  Clicking on this button, located at the top of each technology diagram, will display general technology information.

- Projects

  You can obtain more detailed information on individual projects (specific technology development activities) within a technology by clicking on the projects buttons. These buttons are color-coded to distinguish the funding source.

- Next Level Up

  This button will let you move from a subtechnology diagram to the parent technology diagram or from a technology diagram to the top-level diagram. It effectively "unlayers" your screen.

- Previous

  This button activates the last diagram viewed before whatever is currently on the screen.

- Print

  Click on this button to print the contents of the current screen.

- Key

  This button provides a color-coding key for the projects buttons.

- OK

  This button clears dialog boxes from the screen.

- Quit

  This button stops the program and returns Microsoft Excel to its original settings.

6.0 TECHNICAL SUPPORT

The UST-ID TIS was created by Enserch Environmental, Inc., under direction by the Westinghouse Hanford Company. Any comments and questions regarding the program itself may be forwarded to:

Carina Susiene
Enserch Environmental, Inc.
Bellevue, WA
Phone: (206) 451-4981
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