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Tank Farms Restoration and Upgrades Program Plan

J. D. Bigbee
Westinghouse Hanford Company

G. D. Bouchey
Science Applications International Corporation

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Westinghouse Hanford Company
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Richland, Washington 99352

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J. D. Bigbee, Tank Farms Engineering and Projects, Project Definition — Date

Prepared by: _____ 1/25/93
G. D. Bouchey, Manager
Science Applications International Corporation — Date

Reviewed by: _____ 1-25-93
G. L. Crawford, Manager
Engineering Integration — Date

Reviewed by: _____ 1/26/93
J. O. Honeyman, Manager
Strategic Planning and Systems Integration — Date

Approved by: _____ 1/26/93
J. D. Thomson, Manager
Tank Farms Engineering and Projects — Date

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WHC	SAIC
R. B. Bass	D. Austin
T. W. Fisher	B. Conn
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J. E. Langdon	O. Elgert
C. C. Scaief	D. Harris
M. A. Smith-Fewell	J. Honekamp
M. D. Vanderzanden	J. Kenoyer
M. R. Woychick	M. Lee
	D. Timmons
	P. Patterson

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TANK FARM RESTORATION AND UPGRADES PROGRAM PLAN, REVISION 1

ABSTRACT

The Tank Farm Restoration and Upgrades Program Plan *provides a summary description of action plans to renovate various Tank Farm management control programs, equipment, systems, and facilities. The Tank Farm upgrades identified in the plan are required (1) to ensure safe, environmentally compliant, and efficient operation of the facilities or (2) to support the waste cleanup mission at the Hanford Site. The program plan identifies planned Tank Farm upgrades through the Year 2000. The document summarizes the need basis (i.e., the justification) for planned upgrades and major uncertainties in upgrade planning. Summary-level schedules and interdependencies between projects and upgrade tasks are presented.*

The Tank Farm Restoration and Upgrades Program Plan *is provided to meet* Federal Facility Agreement and Consent Order[1] *milestone M-02-03-T1 and represents phase 1 of a comprehensive update of the program plan. Phase 2 of the update will be*

[1]Ecology, EPA, and DOE, 1990, *Hanford Federal Facility Agreement and Consent Order*, 2 Vols, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

published in June 1993 and will provide additional schedule and cost detail associated with proposed Tank Farm upgrade projects and work tasks. The Tank Farm Restoration and Upgrades Program Plan *is a living document that will be revised periodically to reflect evolving long-range planning associated with Tank Farm safety, operations, and Hanford Site waste cleanup activities.*

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ACRONYMS

ALARA	As Low As Reasonably Achievable
AW	Aging Waste
CAM	Continuous Air Monitor
CASS	Computer-Automated Surveillance System
COB	Cleanout Box
CSC	Central Surveillance Computer
CWO	Capital Work Order
DBR	Design Basis Reconstitution
DCRT	Double-Contained Receiver Tank
DOE	U.S. Department of Energy
DST	Double-Shell Tank
FDC	Functional Design Criteria
FHA	Fire Hazards Analysis
FIC	Food Instrument Corporation
FSAR	Final Safety Analysis Report
FSB	Final Safety Basis
FY	Fiscal Year
GOCO	Government-Owned and Contractor Operated
GPP	General Plant Project
HDAT	Hand-Held Data Acquisition
HEPA	High-Efficiency Particulate Air (filter)
HVAC	Heating, Ventilation, and Air Conditioning
HWVP	Hanford Waste Vitrification Plant
INPO	Institute of Nuclear Power Operations
ISB	Interim Safety Basis
LI	Line Item
LOW	Liquid Observation Well
M&TE	Measuring and Test Equipment
MCA	Material Condition and Aging
MEL	Master Equipment List
MIP	Maintenance Implementation Plan
MSA	Major System Acquisition
MWTF	Multi-Function Waste Tank Facility
NEPA	*National Environmental Policy Act of 1969*
NFPA	National Fire Protection Agency
OJT	On-the-Job Training
OSR	Operational Safety Requirements
P&ID	Process and Instrument Drawing
PBT	Performance-Based Training
PFP	Plutonium Finishing Plant
PUREX	Plutonium Reduction-Extraction Facility
RCRA	*Resource Conservation and Recovery Act of 1976*

ACRONYMS (Continued)

RTU	Remote Terminal Unit
SACS	Surveillance Analysis Computer System
SAR	Safety Analysis Report
SCADA	Supervisory Control and Data Aquisition
SEL	Safety Equipment List
SSC	System, Structure, or Component
SST	Single-Shell Tank
TMACS	Tank Monitor and Control System
Tri-Party	Hanford Federal Facility Agreement and Consent Order Agreement
TRU	Transuranic
TSR	Technical Safety Requirement
TWRS	Tank Waste Remediation System
USQ	Unreviewed Safety Question
WAC	Washington Administrative Code
Westinghouse	Westinghouse Electric Corporation
WHC	Westinghouse Hanford Corporation
WT	Waste Transfer

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1.0 INTRODUCTION

This *Tank Farms Restoration and Upgrades Program Plan* identifies the major programmatic and hardware upgrades necessary for safe and efficient operation of Tank Farm facilities and establishes action plans to implement these upgrades.

This plan is a complete revision of the *Tank Farm Restoration and Upgrades Program Plan* published in June 1991;[1] however, the previous plan was used as a starting point for this revision and some of the projects from the earlier plan remain unchanged. Upgrade planning is based on current requirements from U.S. Department of Energy (DOE) orders, Washington State regulations, applicable industry codes and standards, and the results from numerous external audits and internal self-assessments of Tank Farm physical conditions and program deficiencies.

The plan will serve as a technical basis for budget planning and budget submittal associated with Work Breakdown Structure element 1N3.

1.1 TANK FARM DESCRIPTION

Radioactive liquid waste produced as a byproduct of the chemical processing of irradiated nuclear reactor fuel is processed and stored at the Hanford Site in large underground tanks. These tanks are located in several tank groupings referred to as the Tank Farms. The contents of the tanks consist of liquids of varying chemical composition and precipitated sludge and/or saltcake formed during evaporation processes.

Between 1943 and 1964, 149 single-shell tanks were constructed, and 28 double-shell tanks were placed in service between 1971 and 1986. The last single-shell tank was taken out of service in 1980 (i.e., no additional waste was routed to a single-shell tank after November 1980). All of the double-shell tanks are still in service. All of the Tank Farms are located in the 200 East and the 200 West Areas of the Hanford Site. Transfer capabilities exist between waste tanks, waste tank farms, and waste processing facilities; however, only the newest transfer lines are suitable for use.

The Tank Farm facilities include evaporator facilities to reduce the volume of dilute waste solutions, which in turn reduces the number of tanks required for waste storage. The 242-A Evaporator has been modified to extend its design life and to upgrade its control systems. The 242-A Evaporator control room contains a Computer Automated Surveillance System terminal, which provides routine and alarm message printouts and audible alarms when offnormal conditions are detected by surveillance sensors.

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[1]WHC, 1991, *Tank Farms Upgrades Program Plan*, WHC-EP-0392, Westinghouse Hanford Company, Richland, Washington.

Additional details regarding tanks, evaporators, and other Tank Farm facilities and equipment can be found in the facility safety analysis reports.

1.2 WASTE TANK FARM MISSION

The mission of the Tank Waste Remediation System (TWRS) Program is to store, treat, and immobilize highly radioactive Hanford Site tank waste in an environmentally sound, safe, and cost-effective manner. The vision, mission, goals, and objectives for TWRS is included as Appendix A.

1.3 PROGRAM PLAN APPROACH

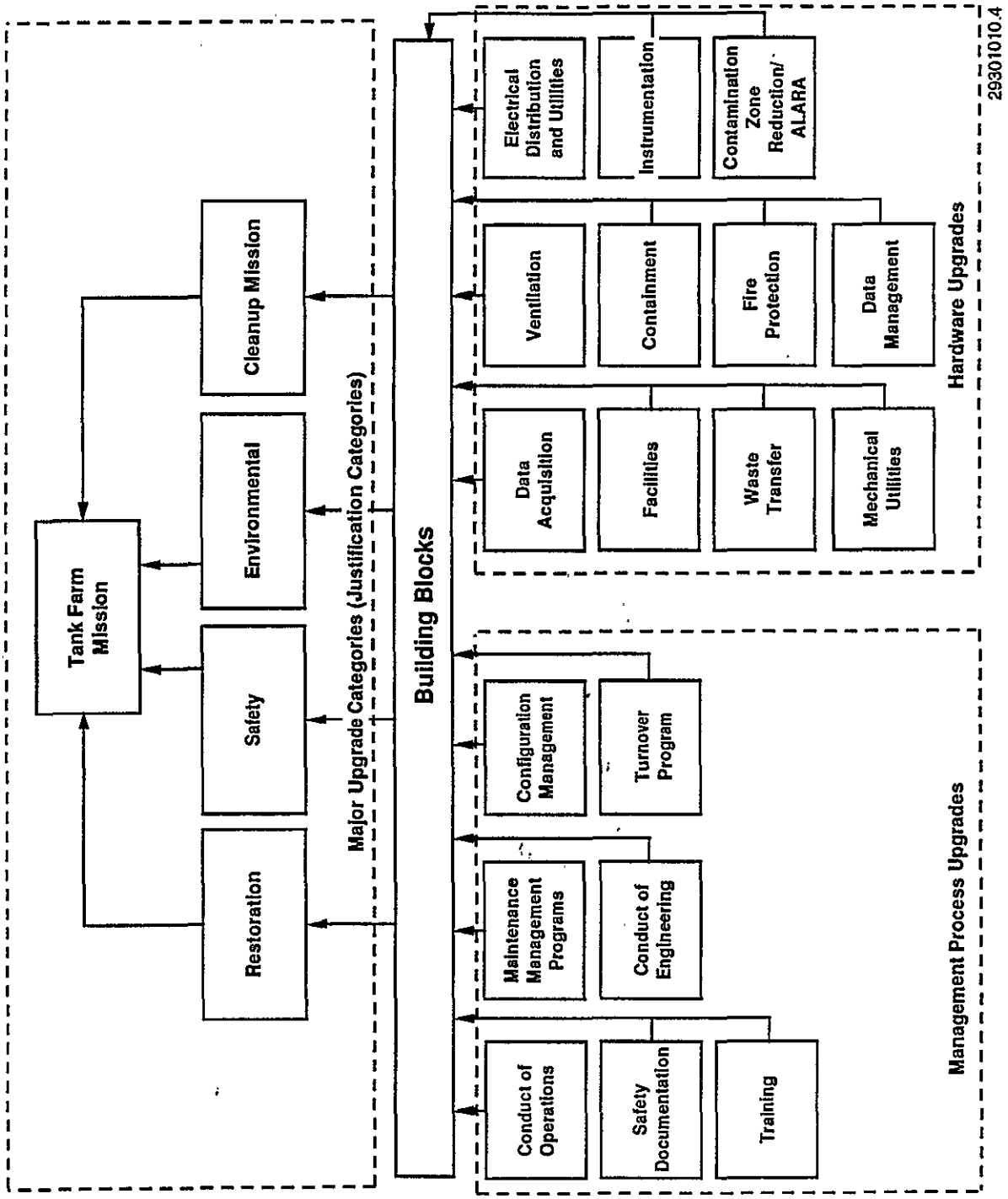
The approach in this program plan is to identify building blocks (i.e., enabling conditions) that must be implemented to accomplish the Tank Farm mission. Major building blocks include various management control program improvement initiatives (e.g., configuration management program upgrades, conduct of operation program improvements) as well as numerous improvements to the Tank Farm equipment, facilities, and supporting infrastructure. An action plan is identified for each building block. The concept for the summary of the Tank Farm Restoration and Upgrades Program is shown in Figure 1-1.

This program plan also summarizes the rationale, or justification basis, associated with the major building blocks. Four general upgrade categories (i.e., justification categories) are identified to support the Tank Farm mission. Each of the four upgrade categories listed below are discussed in more detail in Sections 2.0 through 5.0.

1. Restoration of Current Design and Operating Basis - Certain upgrades are undertaken to restore or renovate existing nonfunctional or degraded equipment so that it meets the intent of the original operating or design basis. In some cases where the original design basis is unknown or poorly defined, upgrades are performed to restore a reasonable level of functionality. This category of upgrades often involves ad hoc improvement initiatives where it is judged that equipment that has degraded with age or neglect must be renovated to meet the current operating basis and to support the overall Tank Farm mission.

2. Safety Upgrades - Many of the proposed Tank Farm upgrades are necessary to maintain and operate the Tank Farm facilities safely and in compliance with current requirements, standards, and practices for nuclear waste storage and processing facilities. Certain upgrade projects may also be needed to resolve open safety issues associated with tank waste storage configuration. Many of the restoration activities discussed above will also be required to meet future interim or final safety authorization bases.

Figure 1-1. Tank Farm Restoration and Upgrades Program.



3. Environmental Upgrades - Some planned upgrades are essential to ensure compliance with environmental regulations. As planning for environmental compliance is completed, it may be necessary to add a building block (i.e., action plan) associated with environmental compliance program upgrades.

4. Waste Cleanup Mission Upgrades - Certain Tank Farm upgrades are required to support waste retrieval, processing, and disposal plans.

The action plans for the individual building blocks identify upgrade projects or tasks that support one or more of the four justification categories. Each building block and its subtasks are not unique to a single justification category. For example, tasks within a given building block may be necessary to meet interim or final safety requirements while other tasks may support the cleanup mission. Also, a single task may fall into more than one of the justification categories. For example, a task may fall in the restoration category, but it may also be necessary to meet safety requirements, environmental requirements, cleanup mission needs, or all three.

Each action plan includes the following planning elements:

- Goal - States the objective of upgrades for the building block.
- Summary Action Plan - Describes the actions required to achieve the goal for the subject building block.
- Justification - Provides justification of the need (i.e., rationale) for planned upgrades and discusses priority considerations.
- Milestones - Identifies major projects, tasks, and deliverables; scheduled completion dates are included.
- Tie-ins - Identifies important interfaces and dependencies for the upgrade tasks and with other building blocks.
- Contingencies - Identifies major uncertainties or potential changes that may affect accomplishing building block goals or tasks.
- Schedule - Provides a Gant chart schedule that shows major milestones, task durations, and schedule logic (tie-ins).

The *Tank Farm Restoration and Upgrades Program Plan* building blocks and their relationship to the justification categories are shown in Figure 1-1. Summary action plans for each building block are contained in Section 6.0. The scope of each building block is summarized below.

Management Programs Upgrades:

1. Conduct of Operations - Operational policies, procedures, and practices upgrades that ensure safe and efficient operation of the facilities consistent with current regulations and standards (see Section 6.1).

2. Maintenance Management Programs - Maintenance policies, procedures, and practices upgrades required to maintain the facility in accordance with current regulations and standards (see Section 6.2).

3. Configuration Management - Upgrades of engineering, operations, and maintenance processes that implement effective configuration control of Tank Farm documentation, equipment, and facilities (see Section 6.3).

4. Conduct of Engineering - Upgrades of engineering policies, procedures, and practices to ensure effective design controls, documentation, and implementation (see Section 6.4).

5. Tank Farm Training - Upgrades to Tank Farm training programs and facilities that support effective operations and maintenance of the facilities in conformance with current regulations and standards (see Section 6.5).

6. Turnover Program - Improvements to the process for construction release of equipment, systems, and facilities to operations to ensure all requirements to support configuration management, training, engineering, operations, and testing are completed in a timely manner (see Section 6.6).

7. Safety Documentation - Upgrades to the Tank Farms safety documentation, including safety analysis reports, safety equipment lists, and technical safety requirements. This building block also defines an interim safety basis for intermediate-term operation and a comprehensive final safety basis and safety documentation for all of the Tank Farm facilities (see Section 6.7).

Hardware Upgrades:

8. Containment - Upgrades of structural containment features designed to prevent the release and spread of hazardous and radioactive materials (see Section 6.8).

9. Instrumentation - Replaces instrumentation and associated wiring in Tank Farm equipment and facilities as required to operate safely and efficiently (see Section 6.9).

10. Data Acquisition - Replaces portions of the Computer Automated Surveillance System with new systems capable of performing automatic data acquisition (see Section 6.10).

11. Data Management - Upgrades of Tank Farm management information systems that will allow electronic access to surveillance data, engineering analysis, and reports (see Section 6.11).

12. Facilities - Upgrades various Tank Farm buildings and support facilities that are required to support Tank Farm operations. Facility modifications include certain industrial health and safety upgrades (e.g., asbestos removal) and other improvements to working conditions as well as equipment housing upgrades (see Section 6.12).

13. Ventilation - Upgrades of heating, ventilation, and air conditioning and special ventilation systems to restrict the spread of radioactive materials (see Section 6.13).

14. Electrical Distribution/Utilities - Upgrades of the electrical power distribution infrastructure in Tank Farms (see Section 6.14).

15. Mechanical Utilities - Upgrades to compressed air (process air and instrument air), steam supply, water, and emergency cooling necessary for effective operation of Tank Farm facilities (see Section 6.15).

16. Waste Transfer - Upgrades to transfer piping and leak containment features to reduce the potential for leakage or spills during transfer operations (see Section 6.16).

17. Fire Protection - Upgrades of the 200 Area Tank Farm fire protection systems (see Section 6.17).

18. Contamination Zone Reduction/ALARA - Programs to clean up contaminated soil and facilities in the Tank Farms complex to minimize personnel radiation exposure and to comply with environmental standards (see Section 6.18).

1.4 STRATEGY AND SCHEDULE FOR TANK FARM UPGRADES

Figure 1-2 depicts the cleanup and safety program strategies and their relationship to the Tank Farm restoration and upgrades program. The major upgrade categories (i.e., restoration, safety, environmental, and cleanup mission) tend to be time-phased. Restoration work is being undertaken in the short term to correct known deficiencies. Upgrades associated with safety issue resolution, safety envelope definition, and establishing a well defined safety authorization and operating basis are planned in the intermediate term; an interim safety basis issuance is scheduled in June 1993, and final safety basis issuance is scheduled during the 1996 through 1998 period.[2] Implementing the upgrades anticipated

[2]McGlaughlin, M. A., 1992, *Program Plan for Tank Farms Safety Analysis Reports*, WHC-SD-WM-PLN-009, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

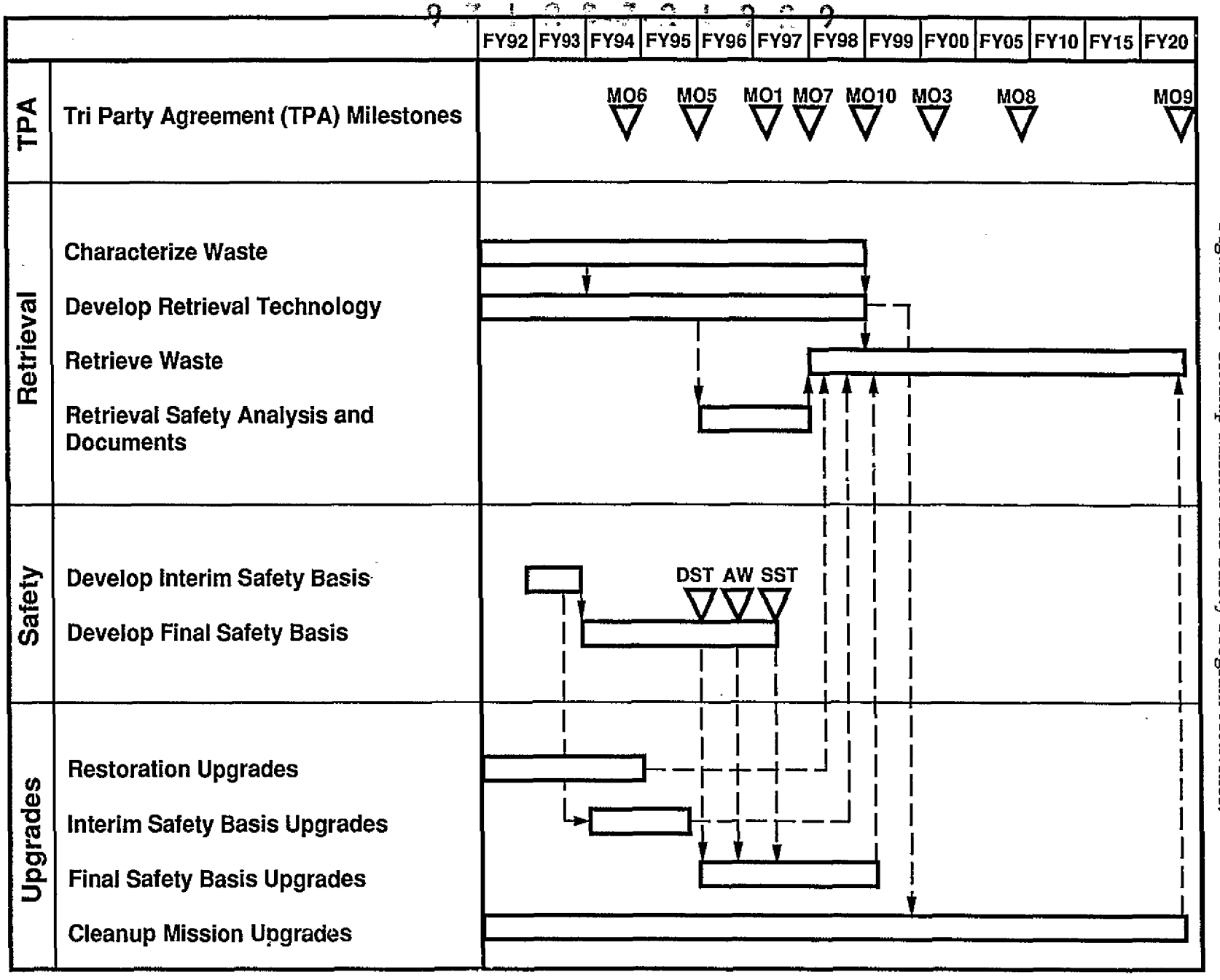


Figure 1-2. Cleanup Mission and Safety Program Activities.

from redefining the safety basis for current planning purposes is assumed to be accomplished in a 2-year period after issuance. Cleanup mission upgrades are phased later in the planning period to support retrieval and ultimate disposal of the tank wastes in the grout and vitrification programs.

Many of the building blocks shown in Figure 1-1 tie-in (i.e., interface) with one another; these interdependencies are discussed in the individual action plans. A summary top-level schedule and representation of the most important tie-ins is shown for management program building blocks (Figure 1-3) and for hardware building blocks (Figure 1-4).

Finally, Table 1-1 lists the major projects or tasks associated with each building block and summarizes the justification basis for each. Currently, many of the planned upgrade projects are justified based on the need to meet known safety and/or environmental requirements, to improve existing management processes, and to renovate degraded facilities and equipment. When additional requirements are defined as a result of development of the interim and final safety documentation and definition of long-term waste cleanup mission planning, upgrade planning will need to be modified to reflect the evolving requirements and planning strategies.

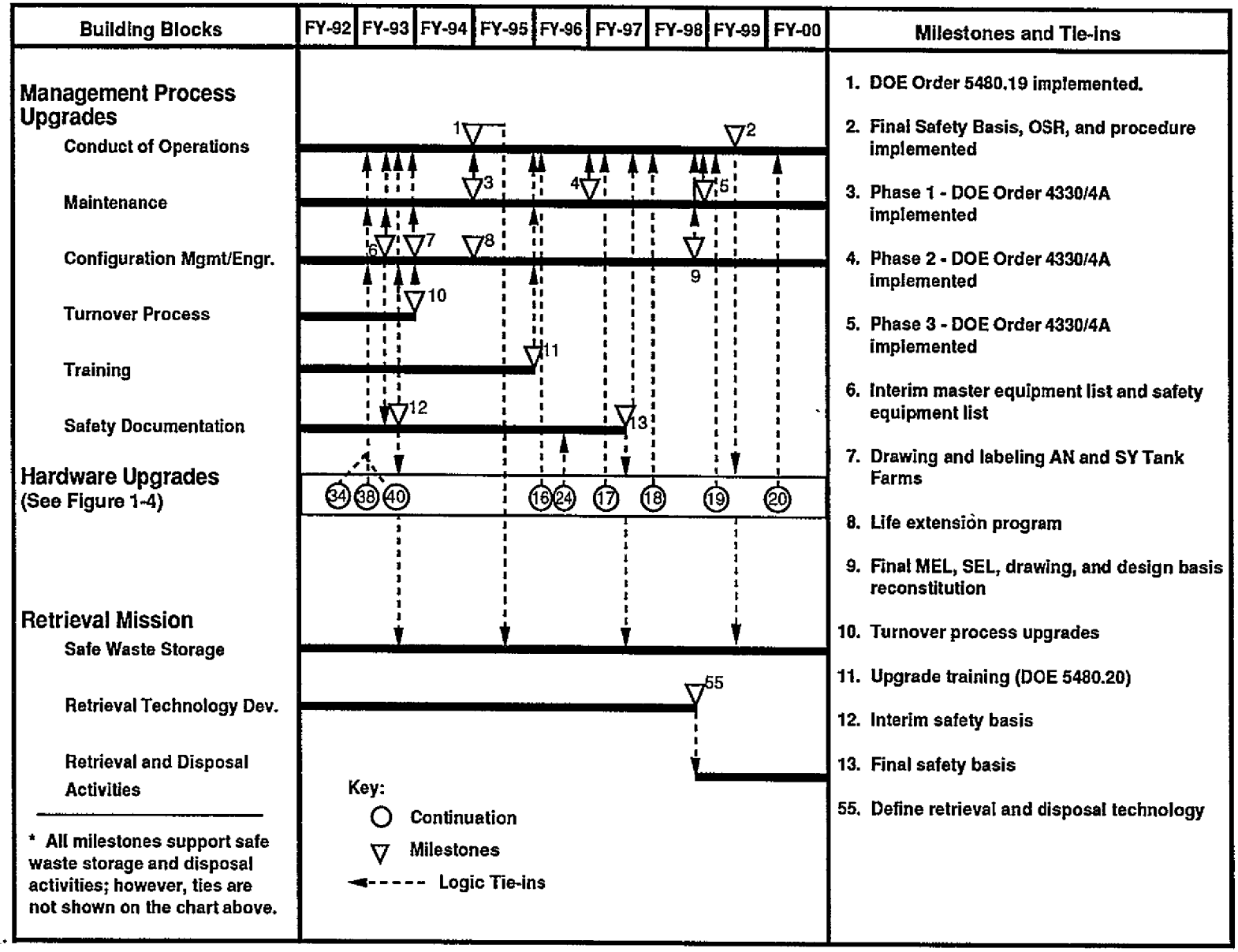


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Figure 1-3. Management Program Building Blocks.

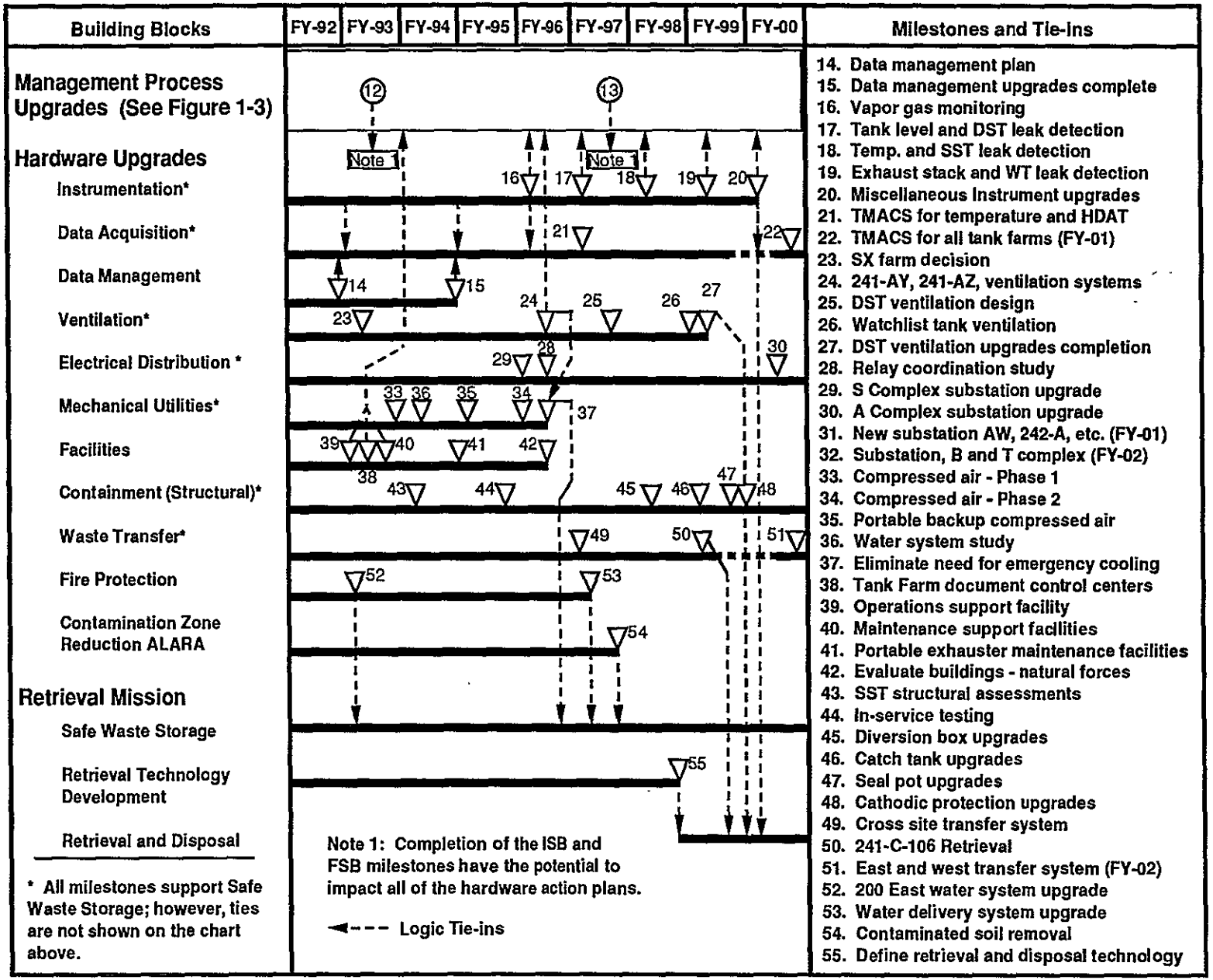

Figure 1-4. Hardware Building Blocks.

Table 1-1. Major Upgrades Summary. (10 sheets)

Action Plan	Project/Task	Upgrades Justification Category					
		Restoration	Safety			Environmental	Retrieval
			Current	ISB	Final		
6.1	**Conduct of Operations**						
	• Revise operational policy and practices to comply with DOE Order 5480.19.	X	X				
	• Strengthen technical and management capabilities of operations staff.	X	X			X	
	• Improve operational training.	X	X			X	
	• Communication enhancements.	X	X				
	• Implement control of equipment and system status.	X	X	TBD	TBD	X	
	• Upgrade operating procedures including alarm response and OSR implementation procedures	X	X	F	F	X	
	• Surveillance data analysis upgrades	X		F	F	X	

Table 1-1. Major Upgrades Summary. (10 sheets)

Action Plan	Project/Task	Upgrades Justification Category					
		Restoration	Safety			Environmental	Retrieval
			Current	ISB	Final		
6.2	**Maintenance Management Programs** • Phase I - Critical Infrastructure Upgrade to Comply with DOE Order 4330.4A. - Maintenance Organization and Administration - Training and Qualifications - Procedures - Planning and Scheduling - Control of Maintenance Activities - Post-Maintenance Testing - Management Involvement	X	X				
	• Phase II - Program Upgrades to Comply with DOE Order 4330.4A. - Facilities, Tools and Equipment - Types of Maintenance (PM) - Material Controls - Facility Condition Inspection - Modification Work	X	X				
	• Phase III - Program Upgrades to Comply with DOE Order 4330.4A. - Maintenance History - Analysis of Maintenance Problems	X	X				

Table 1-1. Major Upgrades Summary. (10 sheets)

Action Plan	Project/Task	Upgrades Justification Category					
		Restoration	Safety			Environmental	Retrieval
			Current	ISB	Final		
6.3	**Configuration Management**						
	• Update technical and administrative procedures.	X	X				
	• Establish training program and train personnel.	X	X	F	F		
	• Establish and implement a design basis reconstitution program.	X	F				
	• Establish and implement material condition and aging program.	X	F				
	• Identify nonconforming plant physical and functional characteristics and provide input for corrective action.	X	X				
6.4	**Conduct of Engineering**						
	• Issue and implement conduct of engineering manual.	X	X	F	F	X	
	• Implement component labeling program.	X					
	• Develop master equipment list (MEL).	X					
	• Develop safety equipment list (SEL).	X	X	F	F		
	• Field verify essential and related drawings.	X	X	F	F	X	
6.5	**Tank Farm Training**						
	• Training and administration - Develop and track training schedules - Establish training program evaluations - Establish compliance with DOE orders - Train training management	X	X	F	F	X	
	• Initiate specific training programs	X	X	TBD	TBD	X	

Table 1-1. Major Upgrades Summary. (10 sheets)

Action Plan	Project/Task	Upgrades Justification Category					
		Restoration	Safety			Environmental	Retrieval
			Current	ISB	Final		
6.6	**Turnover Upgrades Program**						
	• Identify organization responsible for monitoring and controlling turnover process.	X	X				
	• Issue turnover process procedure.	X	X				
	• Implement computerized turnover tracking list.	X					
6.7	**Safety Documentation Upgrades**						
	• Define Interim Safety Basis for Tank Farms.			X			
	• Define Final Safety Basis for DSTs.				X		
	• Define Final Safety Basis for AW Tanks.				X		
	• Define Final Safety Basis for SSTs.				X		
6.8	**Containment**						
	• Develop a plan for assessment of SSTs.	X	X	TBD	TBD	X	
	• Define and implement inservice inspection program for DST.	X	X	TBD	TBD	X	
	• Select method and upgrade diversion boxes.	X	X	TBD	TBD	X	
	• Evaluate requirements for and upgrade catch tanks.	X	X	TBD	TBD	X	
	• Upgrade or replace degraded seal pots.	X	X	TBD	TBD	X	
	• Cathodic protection upgrades.	X	X	TBD	TBD	X	
6.9	**Instrumentation**						
	• Tank level instruments.	X	X	TBD	TBD	X	
	• Tank temperature instruments.	X	X	TBD	TBD	X	
	• Ventilation exhaust stack monitoring system.	X	X	TBD	TBD	X	
	• DST leak detection.	X	X	TBD	TBD	X	
	• SST leak detection.	X	X	TBD	TBD	X	
	• Waste transfer leak detection.	X	X	TBD	TBD	X	
	• Vapor Gas Space Monitoring.	X	X	TBD	TBD	X	
	• Other Instrument (Miscellaneous).	X	X	TBD	TBD	X	

Table 1-1. Major Upgrades Summary. (10 sheets)

Action Plan	Project/Task	Upgrades Justification Category					
		Restoration	Safety			Environmental	Retrieval
			Current	ISB	Final		
6.10	**Data Acquisition**						
	• Replace existing Computer Automated Surveillance System with the Tank Monitor and Control System.	X	X	TBD	TBD	X	
	• Complete Supervisory Control and Data Acquistion System (Project W-223)	X	X	TBD	TBD	X	
	• Automate tank temperature data collection with the Hand-held Data Acquisition for Tank Farms system.	X				X	
6.11	**Data Management**						
	• Develop a Data Management Plan for Tank Farms.	X					
	• Modify the Surveillance Analysis Computer System to provide electronic access identified Tank Farm data.	X				X	
	• Complete Phase II SACS Report Upgrades.	X				X	

Table 1-1. Major Upgrades Summary. (10 sheets)

Action Plan	Project/Task	Upgrades Justification Category					
		Restoration	Safety			Environmental	Retrieval
			Current	ISB	Final		
6.12	**Facilities**						
	• Tank Farm Document Control Centers at 200 East and West (Projects W-264 and W-282).	X					
	• Tank Farms East Operation Support Facility (Project W-116).	X					
	• Regulated Equipment Maintenance Facility (Project W-022).	X					
	• 272 Building Addition (Project W-182).	X					
	• Tank Farm Radiological Support Facilities (Project W-188).	X	X	X	X		X
	• Central Control and Maintenance Facilities (Project W-226).	X					
	• Portable Exhauster Maintenance Facilities (Projects W-287 and W-288).	X					
	• Asbestos Removal in 241-SX-701 and in AX and AY Tank Farms.	X				X	
	• Piping and equipment Removal 241-B and 241-S Tank Farms.	X				X	
	• Evaluate the need for upgrades of buildings housing Safety Class 1, 2 and 3 equipment.	X	X				
	• Hazardous Waste Accumulation and Storage Areas (Project W-273).	X				X	X
	• 200 East Office Facility (Project L-091).	X					
	• Radiation Zone Area Lighting upgrade (Project W-280).	X	X	X	X		X

Table 1-1. Major Upgrades Summary. (10 sheets)

Action Plan	Project/Task	Upgrades Justification Category					
		Restoration	Safety			Environmental	Retrieval
			Current	ISB	Final		
6.13	**Ventilation**						
	• 241-AY and 241-AZ Ventilation (Project W-030).	X	X	TBD	TBD	X	
	• Double-Shell Tank Farm Ventilation (W-061).	X	X	TBD	TBD	X	
	• SX Tank Farm Ventilation.	X	X	TBD	TBD	X	
	• Replace Tanks 241-A-105 and 106 portable exhauster with a new permanent system.	X	X	TBD	TBD	X	
	• Ferrocyanide Watchlist Tanks.	X	X	TBD	TBD	X	
	• Organic Watchlist Tanks.	X	X	TBD	TBD	X	
	• Hydrogen Watchlist Tanks.	X	X	TBD	TBD	X	
	• SST Ventilation (W-230).	X	X	TBD	TBD	X	
6.14	**Electrical Distribution/Utilities**						
	• Create a relay coordination study of all Tank Farm substations.	X	X				
	• Upgrade S Complex substation.	X	X	X	X		X
	• Upgrade A Complex substation.	X	X	X	X		X
	• Install a new substation for AW, AP, 242-A, 204-AR, and 244-AR.	X	X	X	X		X
	• Install a new substation for B, BX, BY and T, TX, TY Tank Farms.	X					

Table 1-1. Major Upgrades Summary. (10 sheets)

Action Plan	Project/Task	Upgrades Justification Category					
		Restoration	Safety			Environmental	Retrieval
			Current	ISB	Final		
6.15	**Mechanical Utilities**						
	• Installation of compressed air system upgrades at 241-AW-273, 241-SX-701, 241-U-701, 241-T-701, and 241-CR.	X	X	TBD	TBD		
	• Complete the user requirement studies, the design, and the installation of the compressed air system upgrades at 241-A-701, 241-BY/BX, 241-B, 242-TX-601, 2712-B, 244-AR, 241-AN, and 241-AW.	X	X	TBD	TBD		
	• Design, procure, install and test a portable backup compressed air system that would be suitable for use in case of system failure at most locations.	X	X	TBD	TBD		
	• Assessment of the impact of discontinuing Tank Farm dependence on the 200 Areas Central Steam System.	X					
	• Assess the conditions of the water systems backflow preventers. Determine the need for and scope of system upgrades.	X	X	TBD	TBD		
6.16	**Waste Transfer**						
	• Cross Site Transfer System (Project W-058).	X			TBD	X	X
	• Waste Transfer System (Project W-201).	X			TBD	X	X
	• Tank 241-C-106 Retrieval (Project W-139).	X	X	TBD	TBD	X	
	• Spare Transfer Pump Storage and Test Pit Upgrade.	X			TBD	X	X
6.17	**Fire Protection**						
	• Sanitary and Raw Water System Upgrades in 200 East (L-005) and 200 West (L-007).	X		TBD	TBD		
	• Water Delivery System Upgrade (B-604).	X		TBD	TBD		

Table 1-1. Major Upgrades Summary. (10 sheets)

Action Plan	Project/Task	Upgrades Justification Category					
		Restoration	Safety			Environmental	Retrieval
			Current	ISB	Final		
6.18	**Contamination Zone Reduction/ALARA**						
	• Near-Term Plans (FY93):						
	- Surface seal required tank farms.	X				X	
	- Survey and release applicable tank farms to radiological controls.	X				X	
	- Interim-stablize 216-A-40 Retention Basin.	X				X	
	• Long-Term Plans (Post FY93):						
	- Collect and stabilize in the vicinity of the cross-site transfer line.	X				X	
	- Stabilize 241-BX, 241-BY, and 241-C Tank Farms and CR Vaults.	X				X	
	- Remove spot contamination from areas outside tank farms and seal where required.	X				X	
	- Stabilize 241-S, 241-SX and 241-U Tank Farms.	X				X	
	- Evaluate performances of sealout and reapply where necessary.	X				X	
	- Stabilize 241-A, 241-AN, 241-AX, 241-AT and 241-AZ.	X				X	
	- Stabilize 244-AR, 242-B, 242-T, the basins and cribs.	X				X	

Legend:

X=Scope defined in current planning.

F=Upgrade included in current planning but requires future re-evaluation of scope based on interim/final safety envelope definition or Tank Waste Remediation Program Planning.

TBD=The need for additional upgrades will be determined at a later date.

Blank=Not applicable.

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2.0 RESTORATION OF CURRENT DESIGN AND OPERATING BASIS

Tank Farm systems at the Hanford Site were constructed from 1943 through the present. The criteria, regulations, and standards governing Tank Farm design, construction, operation, and maintenance have undergone extensive evolution since 1943. Most of the tanks, ventilation systems, and waste transfer systems do not comply fully with current U.S. Department of Energy (DOE) orders and other current regulatory requirements. For example, the electrical distribution system was installed in phases with different design approaches for distribution, grounding, and personnel protection. Instrumentation and control systems are also of varying designs and cannot provide reliable information on in-tank or waste transfer operating conditions. The drawing and documentation systems were not kept current with the additions and changes that have occurred in the Tank Farms over the years, resulting in an inaccurate, confusing, or nonexistent configuration baseline. Numerous approaches to equipment numbering and labeling were also instituted. Surface contamination from years of waste storage and transfer operations is spreading from the Tank Farms.

Aging equipment and facilities, coupled with out-of-date operating and maintenance practices and limited funding over the years for maintenance, repair, and replacement have left the entire Tank Farm infrastructure in need of major renovation to support its safe operation until final waste disposal and Site cleanup are completed.

Many of the upgrade projects include near-term restoration activities, which involve repair of broken, malfunctioning, or degraded equipment. In some cases, restoration tasks also involve replacement of obsolete equipment that is no longer available commercially. It is also clear that many of the restoration tasks will be needed to operate the facilities within the final safety envelope that is currently being developed.

The first step in defining needed restoration upgrades is to develop a clear picture of the current status of Tank Farm equipment and facilities. When completed, the Tank Farm Condition charts in Appendix B will provide a snapshot of the current operability of Tank Farm systems and equipment. The Tank Farm Condition charts will show many Tank Farm deficiencies that must be addressed. Deficiencies that can be resolved by routine day-to-day maintenance are not included in the scope of this program plan. However, many deficiencies require either major maintenance or capital upgrade tasks to restore adequate functionality.

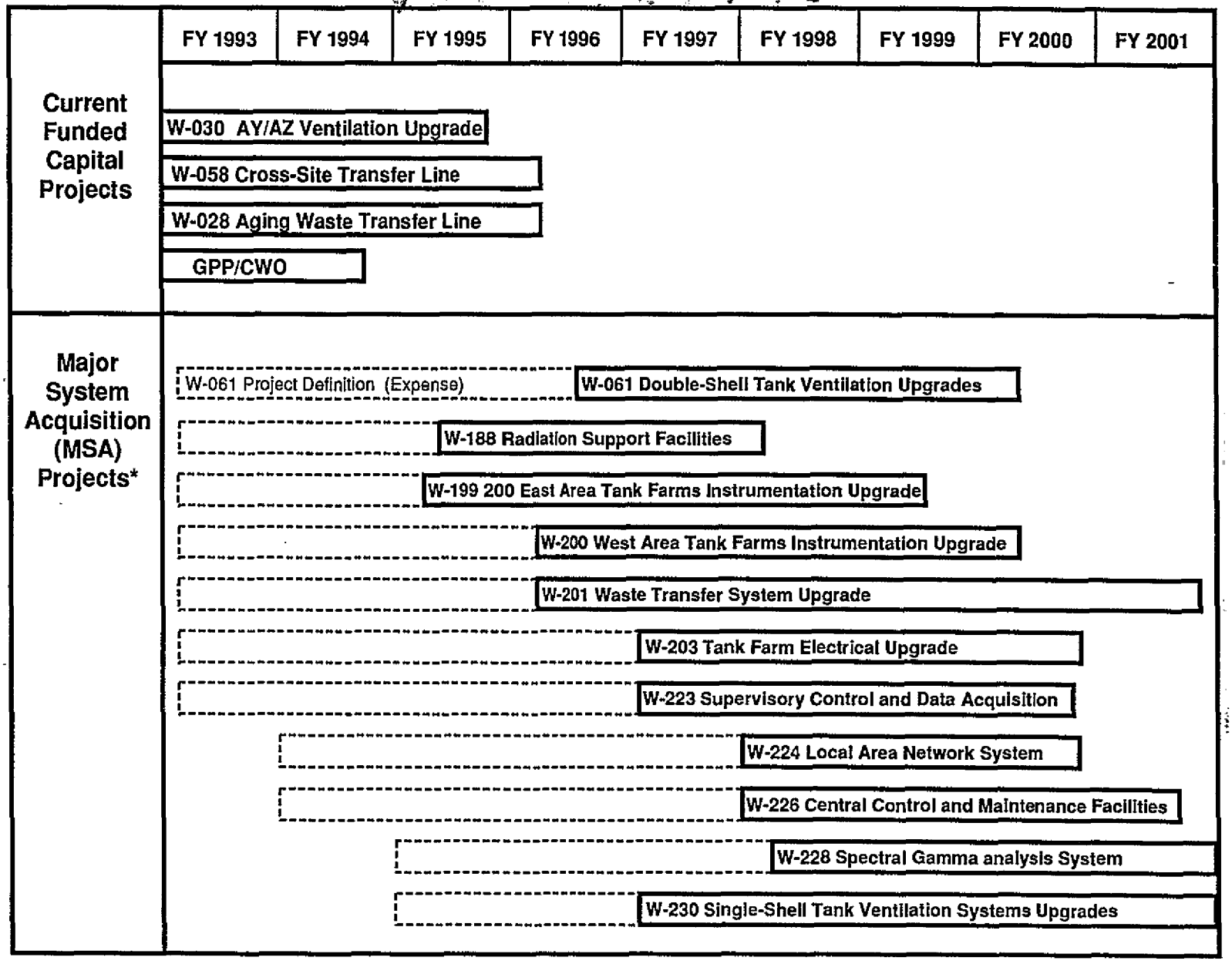
Near-term ad hoc upgrades include both expense funded and capital improvement projects. Capital projects typically require expense funding to initiate the project and for project management. Table 2-1 lists the expense workscope for fiscal year (FY) 1993, and Figure 2-1 identifies the currently funded Capital Upgrade Projects for Tank Farms and several Major System Acquisition (MSA) projects (W-314) that have been proposed to

support the restoration of Tank Farms. In addition to the MSA projects, recent evaluations at Tank Farms have identified a list of key surveillance improvement upgrades that are needed.

The tables in Appendix C provide a detailed listing of MSA projects (W-314) and surveillance improvement projects that require near-term funding. These tables identify estimated cost and the relationship of these projects to the building blocks in this program plan. It should be noted that additional planning work is required to fully define the scope, time, and cost of proposed MSA (W-314) and surveillance improvement projects and to ensure that these Tank Farm needs are adequately reflected in the action plans of Chapter 6.0 of the program plan. This additional planning effort will be accomplished by the Phase 2 revision of the plan scheduled for June 1993.

Table 2-1. Fiscal Year 1993 Expense Workscope Tank Farm Upgrades.

Action Plan	Workscope Description	Cost (x $1,000)
	Capital Project Support	
6.16	• Cross-Site Transfer (W-058)	500
6.13	• Ventilation Upgrades (W-030)	297
6.12	• General Plant Projects	350
NA	• Project Definition	1,913
	Tank Farm Operations and Maintenance	
	• Facilities and Equipment (Major Maintenance)	5,320
6.9	- Alarm Panel Upgrades	
6.15	- Compressor Upgrades	
6.14	- Site Electrical	
6.12	- Asbestos Removal	
6.7	- Safety Documentation	
	- Miscellaneous	
	• Engineering Support for Major Maintenance	2,629
	Conduct of Operations	
6.3	• Configuration Management	2,150
6.2	• Maintenance Infrastructure	183
6.1	• Procedure Upgrades	1,759
6.4	• Conduct of Engineering	1,233
	Upgrades Program Management	
NA	• Program Management	1,615
Total		18,020



* Timing and scope of the proposed Major Aquisition Projects is currently under evaluation and will be defined more specifically in future revisions of this plan

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Figure 2-1. Tank Farm Upgrades Capital Projects.

The action plans in Section 6.0 of this program plan identify specific tasks, milestones, and tie-ins with other projects. The major action plans that include near-term restoration work are noted below.

- Instrumentation - Much of the Tank Farm instrumentation is obsolete or has degraded to the extent that replacement is necessary to restore the capability to operate the facilities. Upgrade projects outlined in this action plan are intended to restore an acceptable level of functionality for selected instrumentation types.

- Ventilation - Current ventilation systems are generally in poor physical condition, and continued safe operation is not ensured. Upgrading will be required to meet current design standards.

- Mechanical Utilities - Mechanical compressed air utilities are being restored to service for selected facilities and buildings because of the poor condition of existing equipment, inadequacy of the compressed air services provided, and the importance of the operational function provided.

- Electrical Distribution/Utilities - Selected substations are being upgraded and new substations are being added. Most of the existing electrical distribution equipment is old, and repair or replacement parts are hard to find. Relay coordination studies and resultant upgrades are also planned to achieve reliable electrical power services for key operating equipment and facilities.

- Facilities - A number of projects to upgrade Tank Farm buildings and operations/maintenance support facilities are being implemented. These facility upgrades provide office and shop space in support of operations, maintenance, and health physics staffs; provide local document control centers in the 200 East and West Areas; and remove hazardous asbestos from certain facilities.

Restoration upgrade activities must also include improvements to many of the management control systems, at least to a level sufficient to support the renovation effort. Improvements of programs, such as configuration management, turnover program, conduct of operations, and maintenance management programs, will be improved concurrently with hardware restoration. At a minimum, these supporting processes must be sufficient to ensure proper documentation, configuration control, operational controls, and future maintenance.

3.0 SAFETY UPGRADES

Storing and processing tank wastes in a configuration that ensures an acceptable level of employee safety and protection of public health and safety is a major focus of the Tank Farm mission. Evolving safety requirements and standards, aging tank facilities, and improved technical understanding of some of the potential hazards associated with tank waste have resulted in increased emphasis on safe operation of the Tank Farms in recent years. The safety documentation that exists at Tank Farms does not meet current standards. Upgrading the waste tank safety analysis and operational safety requirements (OSRs) is needed to provide a well-defined technical basis and operating envelope that ensure safe operation pending ultimate retrieval and disposal of the wastes. Lack of adequate configuration control over the years, facility aging, and limited funding for routine maintenance and upgrading of facilities also have contributed to the need for upgrades to bring about compliance with safety requirements.

Upgrading safety documentation and achieving safe tank operation as proposed to DOE will involve an integrated strategy for compliance with DOE Orders 5480.21,[1] 5480.22,[2] and 5480.23.[3] Ad hoc renovations will be implemented as needed in the near term to achieve base safe operation. By mid-1993, an interim safety basis will be defined that includes interim OSRs, an interim safety equipment list, and interim hazards analyses that form a basis for intermediate-term operation. Finally, an in-depth, well documented technical safety authorization basis will be established and documented first for double-shell tanks, followed by aging-waste tanks and single-shell tanks sequentially. Figure 3-1 depicts the strategy for upgrading the technical safety basis.

3.1 WASTE STORAGE TANK SAFETY ISSUES

In early 1990, safety concerns were raised about the potential for chemical explosion in some Hanford Site tanks. The explosion or rapid burning of gases could result from ferrocyanide-nitrates/nitrites reaction, hydrogen-nitrous oxide combustion, or high organic combustion; some tanks fall in more than one area of concern.

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[1]DOE, 1992, *Unreviewed Safety Questions*, DOE Order 5480.21, U.S. Department of Energy, Washington, D.C.

[2]DOE, 1992, *Technical Safety Requirements*, DOE Order 5480.22, U.S. Department of Energy, Washington, D.C.

[3]DOE, 1992, *Nuclear Safety Analysis Reports*, DOE Order 5480.23, U.S. Department of Energy, Washington, D.C.

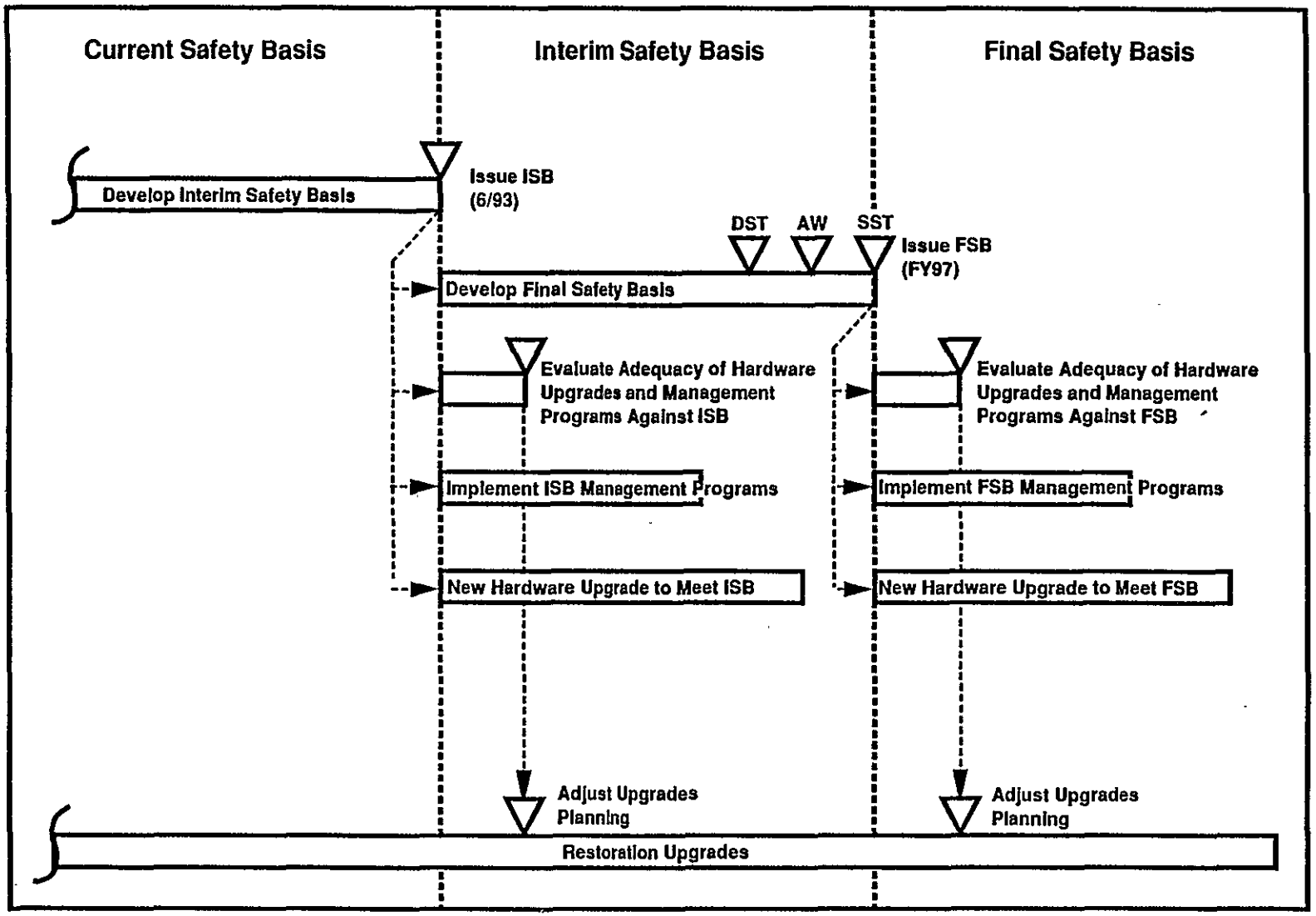

Figure 3-1. Safety Upgrades Approach.

Fifty-three tanks have been identified as having a serious safety concern and are referred to as Watchlist tanks.[4,5] A number of tanks received ferrocyanide in the 1950s. Twenty-four of these tanks may have received enough that the ferrocyanide, when mixed with the sodium nitrate/nitrite, could explode if heated to high enough temperatures. Twenty-three tanks have a potential to release flammable gases. Of particular concern is tank 241-SY-101, which exhibits gas buildup and periodic release. Eight tanks contain solid salts with high organic material content that is also potentially flammable. In addition, one single-shell tank (241-C-106) requires that water be added to control high temperature.

Interim operational controls are in place to reduce the potential for generating an ignition source for tanks that possess an exothermic reaction potential. Actions underway to mitigate the safety concerns are receiving extensive internal and external reviews.

3.2 SAFETY ANALYSIS AND DOCUMENTATION UPGRADE PLANS

The safety documentation building block (Section 6.7) describes the major tasks needed to prepare a final safety basis and to update the safety analysis reports (SARs) for the Tank Farms. Currently, 15 separate SARs of varying quality exist; these documents will be upgraded to meet DOE Order 5480.23 requirements, and the SARs will be consolidated into single-source safety documents. The double-shell tank SAR will be prepared first and is expected to be completed in fiscal year 1996. SARs for aging-waste tanks, single-shell tanks, and other facilities will follow as described in Section 6.7.

In fiscal year 1993, interim safety basis (ISB) documentation for all Tank Farms facilities will be issued pending preparation of upgraded and consolidated SARs. The ISB provides the information necessary to conclude that hazards are controlled and that current and planned activities can be conducted safely. The ISB provides a basis for interim operations and defines any needed restrictions on interim operations during the period of time required to develop and implement the final safety authorization basis documentation. The ISB serves as the interim safety authorization basis for unreviewed safety questions determinations required under the provisions of DOE Order 5480.21. The contents of the ISB for Tank Farms will include the following:

- Current facility description and operational mode
- Hazard assessment
- Safety equipment list
- OSRs and Operating Safety Limits

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[4]Reep, I.E., 1992, *Waste Tank Safety Program Overview Plan - N2 End Function - Formerly WIW*, WHC-EP-0426, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

[5]"Safety Measures for Waste Tanks at Hanford Nuclear Reservation," Section 3137 of *National Defense Authorization Act for Fiscal Year 1991*, Public Law 101-510, November 5, 1990.

- Configuration management and administrative controls to maintain safe operation
- Conclusion regarding the acceptability of the risk associated with the facility.

The ISB approach, as depicted in Figure 3-1, provides near-term enchancement of Tank Farms operational safety. As upgrades identified by the ISB are implemented, gradual improvement of Tank Farm safety margins will be achieved. The final safety authorization basis will be identified in fiscal year 1997, with full DOE safety order compliance achieved upon implementation of any upgrades that may be indicated by the final SARs and technical safety requirements.

The ISB may provide information by reference to existing assessments, analyses, or evaluations when appropriate. The ISB policy for Tank Farms is to be defined by Section 8.0 of WHC-CM-4-46.[6] Once the ISB for Tank Farms is issued in June 1993, implementation activities will proceed in parallel with the DOE review and approval process. This approach will allow timely implementation once the necessary DOE authorizations are received.

3.3 SAFETY UPGRADES

New facilities, equipment, and infrastructure must be provided to upgrade the safety of Tank Farms. Many of the ad hoc restoration activities discussed in Section 2.0 are important for safe operation. Planned upgrades that will enhance safety margins are summarized in Table 3-1. The planned restoration and upgrade activities generally will support achieving compliance with the interim safety basis and the final safety basis requirements. However, when the interim safety basis and final safety basis are completed, the need for additional hardware upgrades and certain known programmatic upgrades (e.g., revision of operating and surveillance procedures to meet the new operational safety requirements) must be evaluated and new requirements must be implemented.

[6]WHC-CM-4-46, *Nonreactor Facility Safety Analysis Model*, Westinghouse Hanford Company, Richland, Washington.

Table 3-1. Safety Upgrades Summary. (3 sheets)

Action Plan	Upgrade/Task Description	Justification
6.1	**Conduct of Operation** • Develop and implement OSRs based on interim and final safety basis • Upgrade procedures that implement new OSRs	Required to control operations within acceptable safety envelope.
6.2	**Maintenance Management Programs** • Improved maintenance procedures • Improved control of maintenance tasks • Upgrade preventive maintenance program • Upgrade material condition of facilities and control configuration management backlogs	Required to ensure facilities are maintained within the safety envelope defined by the SAR and TSRs.
6.3/6.4	**Configuration Management/Conduct of Engineering** • Provide field-verified P&IDs • Provide Master Equipment List and consistent numbering/labeling scheme • Establish effective configuration control and management	Required to ensure facilities are maintained within the safety envelope and that future changes do not introduce unreviewed safety questions.
6.5	**Training** • Upgrade to achieve compliance with DOE Orders 5480.20 and 5480.18A.	Required to ensure operation within the safety envelope and in compliance with DOE Orders.
6.6	**Turnover Process** • Process upgrades	Required to ensure new installations have required documentation and testing to support above programs.

Table 3-1. Safety Upgrades Summary. (3 sheets)

Action Plan	Upgrade/Task Description	Justification
6.7	**Safety Documentation Upgrade** • Prepare safety equipment list • Prepare interim safety basis • Prepare final safety basis	Required to ensure safe operation of Tank Farms.
6.8/6.16	**Containment/Waste Transfer** • Structural integrity assessment • Integrity upgrades of selected tanks, transfer lines, diversion boxes, catch tanks, seal pots • Cathodic protection	Required to adequately contain tank wastes and to operate within safety and environmental constraints.
6.9	**Instrumentation** • Level • Temperature • Ventilation exhaust stack monitoring • Vapor space gas monitoring	Much of the instrumentation is obsolete or has degraded to the point that upgrades are required to operate the facility safety.
6.10	**Data Acquisition** • Replacement of CASS with TMACS on limited basis	Required to provide monitoring and data collection necessary to support safe operation.
6.12	**Facilities** • Evaluate buildings housing Safety Class 2 and 3 equipment	Facilities housing Safety Class 2 and 3 equipment must meet applicable hazard protection requirements.

Table 3-1. Safety Upgrades Summary. (3 sheets)

Action Plan	Upgrade/Task Description	Justification
6.13	**Ventilation** • 241 AY and 241 AZ • DST ventilation • SX tank farm decision • 241-A-105 and 241-A-106 • Ferrocyanide Watchlist tanks • Organic Watchlist tanks • Hydrogen Watchlist tanks	Ventilation systems are required for gas vapor control, leak detection, emission monitoring, heat removal, and other safety concerns.
6.14	**Electrical Distribution** • Short circuit and protective relay coordination studies • New substations at S Complex, A Complex, AW/AP, B Farm and T Farm • Replace motor control centers at C Farm and 701A and installing electrical ducts in Tank Farms	Coordination studies are needed to define protection requirements to limit equipment damage (including safety equipment). Replacement of obsolete or degraded equipment support a reliable electric power supply necessary for safe monitoring and operation of the facilities.
6.15	**Mechanical Utilities** • Upgrade compressed air systems • Upgrade water systems	Upgrades necessary to support safety systems.
6.17	**Fire Protection** • 200 Area East water system upgrade • 200 Area West water system upgrade • Upgraded water delivery system for both areas	Fire protection systems must be upgraded in order to meet evolving safety requirements and DOE Orders in this area.

3.4 RETRIEVAL SAFETY ANALYSIS

Retrieval of tank wastes will involve use of specialized equipment, procedures, and operations in addition to those addressed in the interim and/or final safety basis. Thus, safety analyses addressing retrieval operations will be required to describe retrieval operations, systems, and equipment and to define the appropriate safety envelope, OSRs, and technical safety requirements. The retrieval safety analyses will address the retrieval technology to be selected in fiscal year 1994 (Milestone M-06-00) and will be completed in sufficient time to allow review and approval before the full-scale demonstration of retrieval technology at the end of fiscal year 1997 (Milestone M-07-00).[7]

[7]Ecology, EPA, and DOE, 1990, *Hanford Federal Facility Agreement and Consent Order*, 2 Vols, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

4.0 ENVIRONMENTAL UPGRADES

Environmental upgrades involve reducing contaminated areas in single-shell and double-shell tank farms, cooling water ditches, and ponds; environmental upgrades also include efforts to upgrade facilities and equipment to prevent releases of radioactive and chemical pollutants.

Achieving near-term compliance with state and federal environmental regulations is one of the highest priorities at Tank Farms. A list of environmental compliance projects for Tank Farms and the relationship of these activities to the *Tank Farm Restoration and Upgrades Program Plan* action plans is shown in Table 4-1. The environmental projects in Table 4-1 include unfunded environmental compliance issues listed in Appendix D. Table 4-1 also includes action plan projects or tasks discussed in Section 6.0 that are required to meet environmental regulations.

Tank Farm infrastructure upgrades are essential to meet environmental regulations and the Hanford Site environmental cleanup goals. Key building blocks that support environmental regulatory compliance are summarized below.

- Conduct of Operations - Upgrades of operational programs and procedures that ensure compliance with all applicable regulations and environmentally sound practice are a key element in achieving long-term environmental goals.

- Safety Documentation - Definition of operational safety requirements must include appropriate consideration of operating constraints, equipment operability, and surveillance requirements necessary for environmental compliant and sound operation.

- Instrumentation - Many of the planned instrumentation upgrades are essential to support waste tank and supporting facility monitoring and surveillance requirements related to applicable environmental regulations.

- Containment and Waste Transfer - Waste transfer lines, pump pits, diversion boxes, catch tanks, seal pots, and open air condensers have potential for releasing radioactivity and chemicals to the environment. Plans call for upgrading these facilities to achieve compliance with regulations for secondary containment of dangerous waste (see Sections 6.8 and 6.16). Improved inspection equipment will be installed to determine double-shell tank integrity, and structural integrity analyses will be conducted for single-shell tanks (Section 6.8).

- Contamination Zone Reduction/As Low As Reasonably Achievable (ALARA) - The Contamination Zone Reduction/ALARA action plan is to mitigate or terminate the migration of radioactive materials from the regulated Tank Farm areas. After interim stabilization, permanent cleanup/fixation operations will commence (see Section 6.18).

Table 4-1. Environmental Compliance Upgrades Summary. (7 sheets)

Action Plan	Upgrade Activity	Criteria				
		RCRA	WAC	Fed	357 Manual	Solid Waste
6.1	**Conduct of Operations**					
	• Surveillance Data Analysis - Complete definition of surveillance data requirements* - Data trending and review* - Investigation of surveillance anomalies and limited correspondence action* - Operator roundsheets/procedure revisions* - Increased surveillance frequency and negotiate associated compliance agreements*	X	173-303-320	40 CRF 265.15	X	
	• Improve operational training	X	173-303-330	40 CFR 265.16		
	• Implement control of equipment and system status	X	173-303-400	40 CFR 265.193		
	• Upgrade operating procedures including alarm response and OSR implementation procedures	X	173-303-350 173-303-330	40 CFR 265 40 CFR 265.16	X X	
	• Strengthen technical and management capabilities of operations staff					

Table 4-1. Environmental Compliance Upgrades Summary. (7 sheets)

Action Plan	Upgrade Activity	Criteria				
		RCRA	WAC	Fed	357 Manual	Solid Waste
6.2	**Maintenance Management Programs**					
	• Non-OSR leak detection surveillances (PISCES)	X	-	40 CFR 265.195	X	
	- Perform 242A PM/PISCES Program*	X	173-303-320	40 CFR 265	X	
	- Perform PMs/PISCES for storage facilities*	X	173-303-320	40 CFR 265	X	
	- Develop environmental surveillance test program/procedures*-SSTs	X	173-303-320	40 CFR 265	X	
	• Corrective Maintenance for Environmental Compliance Act	X	173-303-320	40 CFR 265	X	
	- DSTs leak detection*	X	173-303-320	40 CFR 265	X	
	- Ventilation and airborn monitoring equipment (planning and scheduling)*	X	173-303-320	40 CFR 265		
	• Implement revised CM/PM priority system for environmental equipment		173-303-370	40 CFR 265.15	X	
6.4	**Conduct of Engineering**					
	• Issue and implement conduct of engineering manual		173-303-400	40 CFR 265.193		
	• Field verify essential and related drawings		173-303-400	40 CFR 265.193		
6.7	**Safety Documentation**					
	• Environmental records management for tank farms*	X	173-303-380	40 CFR 265.73		
	• Environmental compliance corrective action tracking system*	X	173-303-380	40 CFR 265.73		
	• Respond to regulatory agency audits and concerns					

Table 4-1. Environmental Compliance Upgrades Summary. (7 sheets)

Action Plan	Upgrade Activity	Criteria				
		RCRA	WAC	Fed	357 Manual	Solid Waste
6.8	**Containment**					
	• W-020H cathodic protection upgrades*	X	-	40 CFR 265.191		
	• Develop a plan for assessment of SSTs	X	173-303-400	40 CFR 265.191		
	• DST integrity assessment	X	173-303-400	40 CFR 265.191		
	• Select method and upgrade diversion boxes	X	173-303-400	40 CFR 265.193		
	• Evaluate requirements for and upgrade catch tanks	X	173-303-400	40 CFR 265.193		
	• Upgrade or replace degraded seal pots	X	173-303-400	40 CFR 265.193		
6.9	**Instrumentation**					
	• Restore SX laterals*	X	173-303-400	40 CFR 265.193	X	
	• In-tank SST photography*	X	173-303-400	40 CFR 265.193	X	
	• LOW upgrades*					
	- Install LOWs in priority SSTs	X	173-303-400	40 CFR 265.193	X	
	- Drywell van LOW dump station inst.	X	173-303-400	40 CFR 265.193	X	
	• Tank level instruments	X	173-303-400	40 CFR 265.193		
	• Tank temperature instruments	X	173-303-400	40 CFR 265.193		
	• Ventilation exhaust stack monitoring system	X	173-303-400	40 CFR 265.193		
	• DST leak detection	X	173-303-400	40 CFR 265.193		
	• Waste transfer leak detection	X	173-303-400	40 CFR 265.193		
	• Vapor space gas monitoring	X	173-303-400	40 CFR 265.193		
6.10	**Data Acquisition**					
	• Replace existing Computer Automated Surveillance System with the Tank Monitor and Control system	X	173-303-400	40 CFR 265.193		
	• Automatic tank temperature data collection with the hand-held data acquisition for Tank Farms System	X	173-303-400	40 CFR 265.193		

Table 4-1. Environmental Compliance Upgrades Summary. (7 sheets)

Action Plan	Upgrade Activity	Criteria				
		RCRA	WAC	Fed	357 Manual	Solid Waste
6.11	**Data Management**					
	• Modify the Surveillance Analysis Computer System to provide electronic access identified tank farm data	-	173-303-400	40 CFR 265.193		
	• Complete Phase III SACS report upgrades	-	173-303-380	-		
6.12	**Facilities**					
	• Modify 209E to provide for sampling and packaging*	X	173-303-200	40 CFR 262		X
	• Asbestos removal in from 241-SX-701 and AX and AY Tank Farms	X	173-303-395			X
	• Piping and equipment removal from 241-B and 241-S Tank Farms	X		40 CFR 265		X
	• Hazardous waste accumulation and storage areas (Project W-273)	X	173-303-200			

Table 4-1. Environmental Compliance Upgrades Summary. (7 sheets)

Action Plan	Upgrade Activity	Criteria				
		RCRA	WAC	Fed	357 Manual	Solid Waste
6.13	**Ventilation**					
	• 241-AY and 241-AZ ventilation (Project W-030)		173-303-400	40 CFR 265.193		
	• DST farm ventilation (W-061)		173-303-400	40 CFR 265.193		
	• SX tank farm ventilation		173-303-400	40 CFR 265.193		
	• Ferrocyanide Watchlist tanks		173-303-400	40 CFR 265.193		
	• Organic Watchlist tanks		173-303-400	40 CFR 265.193		
	• Hydrogen Watchlist tanks		173-303-400	40 CFR 265.193		
	• SST ventilation (W-230)		173-303-400	40 CFR 265.193		
6.16	**Waste Transfer**					
	• Cross-Site transfer system (Project W-058)		173-480-050			
	• 200 West area transfer system (Project W-201)		173-480-050			
	• 200 East Area transfer system (Project W-235)		173-480-050			
	• Tank 241-C-106 retrieval (Project W-139)		173-480-050			
	• Replacement transfer pumps		173-480-050			

Table 4-1. Environmental Compliance Upgrades Summary. (7 sheets)

Action Plan	Upgrade Activity	Criteria				
		RCRA	WAC	Fed	357 Manual	Solid Waste
6.18	**Contamination Zone Reduction/ALARA**					
	• Near-Term Plans (FY93):					
	- Surface seal required tank farms.	-	173-480-050			X
	- Survey release applicable tank farms to radiological controls.		173-480-050			X
	- Interim-stablize 216-A-40 Retention Basin.		173-480-050			X
	• Long-Term Plans (Post FY93):					
	- Collect and stabilize in the vicinity of the cross-site transfer line.		173-480-050			X
	- Stabilize 241-BX, 241-BY, and 241-C Tank Farms and CR Vaults.		173-480-050			X
	- Remove spot contamination from areas outside tank farms and seal where required.		173-480-050			X
	- Stabilize 241-S, 241-SX and 241-U Tank Farms.		173-480-050			X
	- Evaluate performances of sealout and reapply where necessary.		173-480-050			X
	- Stabilize 241-A, 241-AN, 241-AX, 241-AT and 241-AZ.		173-480-050			X
	- Stabilize 244-AR, 242-B, 242-T, the basins and cribs.		173-480-050			X

Table 4-1. Environmental Compliance Upgrades Summary. (7 sheets)

Action Plan	Upgrade Activity	Criteria				
		RCRA	WAC	Fed	357 Manual	Solid Waste
NEW	• 101 T emergency pumping and compliance plan*	X	173-303-400	40 CFR 265.196	X	
	• Sort, repack, and dispose of 2,000 hazardous waste drums*	X	173-303-630	40 CFR 262 173-303-400		X
	• Dome elevation surveys*	X	173-303-320	40 CFR 265.15	X	
	• WDOH audit*					
	- Develop plan and schedules for WDOH audit funding					
	- Corrective actions					
	• Compliance assessment*	X	173-303	40 CFR 265.193	X	
	- Detailed independent in-field review	X	173-303	40 CFR 265.193	X	
	- Develop corrective action plan	X	173-303	40 CFR 265.193	X	
	- Implement corrective action	X	173-303	40 CFR 265.193	X	

* Currently unfunded (see Appendix D)

WAC 173-303, 1990, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

40 CFR 265, 1992, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, as amended.

WAC 173-480, 1990, "Ambient Air Quality Standards and Emission Limits for Radionuclides," *Washington Administrative Code*, as amended.

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5.0 UPGRADES TO SUPPORT WASTE CLEANUP MISSION

The mission of the Hanford Site Tank Waste Remediation System (TWRS) Program is to store, treat, and immobilize highly radioactive Hanford Site tank waste in an environmentally sound, safe, and cost-effective manner. The TWRS mission must implement treatment and disposal processes consistent with the requirements of the *National Environmental Policy Act of 1969*[1] and *Resource Conservation and Recovery Act of 1976*[2] to meet the Hanford Site's 30-year cleanup goal. TWRS Program goals include the following:

- Mitigate or remediate the waste tank safety issues in a timely manner to permit safe treatment, processing, storage, and disposal of waste in single-shell and double-shell tanks.

- Continue operation and maintenance of the tanks to ensure public, employee, and environmental safety while allowing future implementation of the waste disposition options.

The *Tank Farm Restoration and Upgrades Program Plan* is a supporting element to the overall TWRS mission. Certain upgrades are required for ongoing operation of the Tank Farms; additional upgrades will be needed to support the waste processing, retrieval, and disposal activities. In general, new equipment and systems necessary for retrieval, processing, and disposal will be designed, procured, and provided by the programmatic organization responsible for remediation. However, interfaces exist that require upgrades to Tank Farms infrastructure elements, such as electrical distribution, waste transfer facilities, and mechanical utilities (e.g., compressed air, steam, water, and emergency cooling) to support the cleanup mission.

Currently, the Tank Farm upgrades to support the waste cleanup mission need to be defined. The following upgrades are justified (at least in part) by the cleanup mission.

- Waste Transfer/Containment - In general, the upgrades to waste transfer piping and catch basins are necessary to support retrieval and processing activities.

- Electrical Distribution - Upgrading the electrical power distribution infrastructure will be required to supply power requirements for retrieval and processing equipment and instrumentation.

- Mechanical Utilities - Upgrades to utilities infrastructure as outlined in this action plan will be necessary to service installation of future retrieval and processing systems.

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[1] *National Environmental Policy Act of 1969*, 42 U.S.C. 4321, et seq.

[2] *Resource Conservation and Recovery Act of 1976*, 42 U.S.C. 6901, et seq.

- Facilities - Major System Acquisition projects (W-314) are being considered for new double-shell tank farms and for an initial pretreatment module (see Section 6.12).

- Contamination Zone Reduction/ALARA - Required to greatly improve worker access and safety during retrieval activities.

In addition to these specific hardware projects, most of the planned improvement initiatives in the management control systems areas (e.g., configuration management, design control, conduct of operation, maintenance management programs, training) must be implemented effectively to support the cleanup mission objectives.

As retrieval strategy and needs are better defined, the infrastructure upgrade plans discussed in this document will need to be revised to support evolving mission-related objectives and plans.

6.0 MANAGEMENT PROGRAMS AND HARDWARE UPGRADES

This section contains the summary action plans identified to accomplish the Tank Farm mission. Major building blocks include various management control program improvement initiatives as well as numerous improvements to the Tank Farm equipment, facilities, and supporting infrastructure.

Each action plan includes the following planning elements:

- Goal
- Summary Action Plan
- Justification
- Milestones
- Tie-ins
- Contingencies
- Schedule.

The following lists identify management program and hardware upgrades and the respective section in which the action plan is contained.

Management Programs Upgrades **Hardware Upgrades**

Section	Title	Section	Title
6.1	Conduct of Operations	6.8	Containment
6.2	Maintenance Management Programs	6.9	Instrumentation
6.3	Configuration Management	6.10	Data Acquisition
6.4	Conduct of Engineering	6.11	Data Management
6.5	Tank Farm Training	6.12	Facilities
6.6	Turnover Program	6.13	Ventilation
6.7	Safety Documentation	6.14	Electrical Distribution/Utilities
		6.15	Mechanical Utilities
		6.16	Waste Transfer
		6.17	Fire Protection
		6.18	Contamination Zone Reduction/ALARA

6.1 CONDUCT OF OPERATIONS

6.1.1 GOAL

The objective of the Conduct of Operations action plan is to implement programs and practices that ensure day-to-day operational activities are conducted in a safe manner and are in compliance with DOE orders and applicable standards. The planned operational program upgrades provide the controls needed to support physical upgrades that restore systems, resolve safety concerns, and/or support the long-range Hanford Site cleanup mission.

6.1.2 SUMMARY ACTION PLAN

This action plan describes the programmatic and process upgrades to ensure safe and efficient Conduct of Operations for Hanford Site Tank Farms. Improvements to Tank Farms operational programs and practices are needed to achieve consistently disciplined, effective operation of all facilities in compliance with DOE orders, the Westinghouse Government-Owned and Contractor-Operated Conduct of Operations manual[1], and nuclear industry standards. Substantial progress was made during fiscal year (FY) 1992 toward upgrading the Conduct of Operations at Tank Farms. Currently, several major areas are identified for further improvement:

- Revise operational policies and administrative requirements to be consistent with DOE Order 5480.19[2]
- Strengthen technical and management capabilities of the operations and maintenance supervisors through effective hiring and training
- Implement the upgraded operations training program
- Use operating experience and performance monitoring
- Develop and implement equipment and system status and control programs

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[1]Westinghouse, 1991, *Westinghouse Conduct of Operations Manual*, GOCO Cross-Cultivation Committee, Westinghouse Electric Corporation, Pittsburgh, Pennsylvania.

[2]DOE, 1992, *Conduct of Operations*, DOE Order 5480.19, U.S. Department of Energy, Washington, D.C.

- Upgrade operating procedures including alarm response procedures, surveillance procedures, and operational safety requirements (OSR) implementation procedures.

Planned improvements to Tank Farms operational programs will be implemented as outlined in this action plan. When an interim safety basis and final safety analysis reports (SARs) and OSRs are completed (see Section 6.7), operational procedures, training, and practices will need to be revised to reflect the new safety basis. This interface with the safety documentation development is reflected in this action plan.

6.1.3 JUSTIFICATION

Because of the hazards associated with the chemicals and radioactive wastes at Tank Farms, operators must control systems and equipment within safety limits, OSRs, and the envelope defined by the SARs for the facilities. An important factor in accident prevention and mitigation is the performance of operations personnel. Operator performance is particularly important, considering the age of Tank Farm facilities, degraded instrumentation, lack of redundant systems, and lack of automatic protective devices. A key element in achieving disciplined, efficient, and safe facility operation involves coupling good programs, processes, and procedures with effective management and supervision of operational activities.

Currently, upgrades are required in the Conduct of Operations area to achieve compliance with operational requirements and guidelines contained in DOE Order 5480.19,[3] *Conduct of Operations*, DOE Order 5480.21[4], *Unreviewed Safety Questions*, and DOE Order 5480.22[5], *Technical Safety Requirements*.

6.1.4 MILESTONES

Upgrades of operational policies, programs, and practices are necessary to achieve compliance with the key elements of DOE Order 5480.19, *Conduct of Operations*.[3] Key milestones are summarized below.

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[3]See Note 2.

[4]DOE, 1992, *Unreviewed Safety Questions*, DOE Order 5480.21, U.S. Department of Energy, Washington, D.C.

[5]DOE, 1992, *Technical Safety Requirements*, DOE Order 5480.22, U.S. Department of Energy, Washington, D.C.

Operations, Organization, and Administration:

- Upgrade *Waste Tank Project Administration,*[6] as indicated in the *Tank Farm Conduct of Operation Compliance Plan* including the following:[7]
  - Reorganize WHC-IP-0842 to be more user friendly - FY 1993
  - Incorporate Westinghouse Government-Owned and Contractor-Operated manual policies and principles - FY 1993
  - Review and revise each section of WHC-IP-0842 to incorporate sections of DOE Order 5480.19 - FY 1994
- Implement a supervisory staffing plan and supervisory training program, and assign on-shift engineers - FY 1993
- Charter and staff a systems engineering organization - FY 1994
- Improve operational performance monitoring, including development of a revised performance indicator system, a critique and lessons-learned program, and a self-assessment program - FY 1993/FY 1994
- Establish a formal supervisor qualification program for operations, maintenance, and selected engineering personnel - FY 1993
- Establish a program for rotation of new supervisors within Tank Farms organizations and provide for additional supervisory skills training for incumbent personnel - FY 1994.

Shift Routines and Operating Practices:

- Implement an automated equipment status list - FY 1993
- Complete revisions of operator round data sheets - FY 1993
- Improve operations personnel protection and as low as reasonably achievable (ALARA) practices, including implementation of a more comprehensive radiation worker qualification and requalification training program, implementation of ALARA program training, and development of a Tank Farm-specific health and safety plan - FY 1993

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[6]WHC, 1992, *Waste Tank Project Administration*, WHC-IP-0842, Westinghouse Hanford Company, Richland, Washington.

[7]Conduct of Operations planning information supplied by Tank Farms operations staff.

- Fully implement the *Radiological Protection* manual[8] at Tank Farms - FY 1996
- Review and revise procedures governing resetting protective devices - FY 1993
- Revise the shift manager's duties to better reflect management's expectations for this position - FY 1993
- Upgrade the remaining operator bases (watch station areas) - FY 1993.

Control Area Activities:

- Before restart of the 242-A Evaporator, issue a policy regarding the staffing of the controlled area during steady state and high activity periods - FY 1993.

Communications:

- Add two new radio channels for operations and maintenance - FY 1993
- Conduct operator training on communications procedures - FY 1993.

Control of On-Shift Training:

- Conduct on-the-job training (OJT) on 242-A Evaporator - FY 1993
- Develop and issue a Tank Farm training and administration manual - FY 1993
- Expand training on administration of OJT to include all instructors and subject matter experts - FY 1993
- Complete systems training program and initiate OJT in nuclear operator skill areas - FY 1993
- Complete OJT for all nuclear operator certification areas - FY 1994
- Issue guidance concerning control of trainees for all Tank Farm facilities - FY 1993
- Incorporate DOE Order 5480.19 guidance into Tank Farm training and administration manual - FY 1993.

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[8]WHC-CM-4-10, *Radiological Protection*, Westinghouse Hanford Company, Richland, Washington.

Investigation of Abnormal Events:

- Establish a formal event critique process - FY 1994

Control of Equipment and System Status:

- Upgrade the equipment status sheet to take advantage of already existing computer programs - FY 1993

- Develop and implement an equipment status control program after interim OSRs are implemented - FY 1994

- Implement supporting program improvements in A Complex and 241-D-SY Tank Farm (and to a limited extent in 241-C Tank Farm) - FY 1993. Improvements include the following:

  - Field validation and revision of operating procedures
  - Development of field-verified process and instrument drawings (P&IDs) (Sections 6.3)
  - Equipment labeling (Section 6.3)
  - Establishment of document control centers (Section 6.12)

- Program improvements will be implemented in remaining facilities - FY 1995 and FY 1996. Improvement areas include the following:

  - Field validation and revision of procedures
  - Development of field-verified P&IDs
  - Equipment labeling

- Evaluate the need for a locked valve administrative control program as requisite support program improvements are implemented - FY 1993 through FY 1996

- Implement near-term OSR improvements including data sheet revisions for all facilities - FY 1993.

- Implement the interim OSRs (i.e., limiting conditions for operation and surveillance tracking programs) for the 242-A Evaporator - FY 1993

- Develop a status-of-work-in-process document for use by operating personnel - FY 1993

- Implement a process to conduct operability reviews for work packages and procedures that may alter the status of safety-related systems (as part of interim OSR implementation) - FY 1994

- Develop surveillance procedures for verifying operability as part of post-maintenance testing of 242-A Evaporator - FY 1993

- Develop post-maintenance testing surveillance procedures for all Tank Farm facilities as part of implementing interim OSRs - FY 1994 and 1995

- Improve temporary modification controls including development of field-verified drawings for AN and SY Tank Farms and development of maintenance procedures for jumper and lifted leads - FY 1993

- Complete documentation and engineering disposition of previously installed temporary modifications (after as-built drawing effort is complete) - FY 1997.

Independent Verification:

- Complete independent valve and switching lineup lists for Evaporator 242-A - FY 1993

- Complete independent valve and switching lineup lists for facilities remaining - FY 1996

- Obtain independent verification for all safety-related and switching lineups (as part of P&ID development) - FY 1996

- Issue policies and procedures on independent verification - FY 1993

Operations Turnover:

- Develop a temporary modification program - FY 1994.

Operations Aspects of Facility Chemistry and Unique Processes:

- All transfer procedures will be revised to include chemistry requirements control - FY 1993

- Interim OSRs will include appropriate chemistry and corrosion programs control - FY 1994

- Operator training will be conducted on chemistry control programs and procedures when they have been developed and issued - FY 1994.

Timely Orders to Operators:

- Review previously issued operational directives and policies and reissue under the shift order and standing order program - FY 1993.

Procedures:

- Revise all interim OSR-related operating procedures - FY 1995
- Develop alarm response procedures for 271-AW, 271-A, 271-AN, 271-CR, and SY Tank Farm and surveillance procedures for 242-A Evaporator OSR implementation - FY 1993
- Develop surveillance procedures for interim OSRs - FY 1994
- Develop alarm response procedures for remaining facilities - FY 1995
- Incorporate changes to the Tank Farm procedures writers guide and validation checklist when the DOE writers guide is issued - FY 1993
- Conduct field validations and complete revisions to plant operating procedures for the AN, SY, and AW Tank Farm facilities - FY 1993
- Conduct field validation and complete revisions to plant operating procedures for remaining facilities - FY 1995
- Complete field validation and rewrite all plant operating procedures for remaining facilities - FY 1995.

Equipment and Piping Labeling:

- See support program improvements milestones under Control of Equipment and System Status above. These milestones include equipment labeling tasks - FY 1993 through FY 1996.
- Piping systems will be painted and labeled as part of the facility painting program - FY 1994 through FY 1998.

Certain other Conduct of Operations improvement initiatives in addition to DOE Order 5480.19 upgrades are summarized below. These initiatives include tasks to implement DOE Orders 5480.21, *Unreviewed Safety Questions*, and DOE Order 5480.22, *Technical Safety Requirements*, as well as certain other general Westinghouse Hanford Company Tank Farm management initiatives in the operations area.

DOE Order 5480.21, *Unreviewed Safety Questions*:

- The Tank Farm plant operating committee will evaluate discoveries WHC-CM-1-3[9], using MRP 5.12, "Unreviewed Safety Questions," pending implementation of the waste tanks interim safety basis.

- Issue 242-A Evaporator authorization basis (i.e., interim safety basis) and implement procedures to review facility equipment and/or procedure changes for unreviewed safety question consideration - Procedure submitted for final signatures.

- Issue interim safety basis for all waste tank facilities and implement unreviewed safety question procedures (Section 6.7) - August 1993.

DOE Order 5480.22, *Technical Safety Requirements*:

The technical safety requirements (i.e., OSRs) for Tank Farms will be updated as part of the issuance of an interim safety basis and a final safety basis for the facilities. Key milestones for issuance and implementation of OSRs for Tank Farm facilities in compliance with DOE Order 5480.22 are summarized below.

- Issue interim OSRs for all facilities - June 1993.

- Full implementation of interim OSRs (including program modifications, procedure upgrades, and training) - TBD. Implementation schedule will be established once the interim safety basis is issued. For planning purposes, an implementation period of approximately 2 years is assumed.

- Issue final technical safety requirement:

  - Double-shell tanks - FY 1996
  - Aging-waste tanks - FY 1996
  - Single-shell tanks - FY 1997

- Complete final technical safety requirements implementation (including program modifications, procedure upgrades, and training):

  - Double-shell tanks - TBD (2 years or less)
  - Aging-waste tanks - TBD (2 years or less)
  - Single-shell tanks - TBD (2 years or less)

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[9]WHC-CM-1-3, *Management Requirements and Procedures*, Westinghouse Hanford Company, Richland, Washington.

6.1.5 TIE-INS

- Planned improvements in the area of operator training, operations supervisory training, chemistry control training, and OJT all require support from and an effective interface with the training organization and its action plans.

- New control rooms and offices for shift managers intertie with facility upgrades.

- Development of adequate design basis documentation (including system descriptions, field-verified P&IDs, and other drawings) is a prerequisite to several operational activities (e.g., improved equipment status controls) and represents an important intertie between the Conduct of Operations, Conduct of Engineering, and the Configuration Management action plans.

- Establishment of document control centers at various Tank Farm facilities as part of the Facilities action plan provides important support for Conduct of Operations enhancements.

- Important interfaces between the operations, maintenance, and configuration management action plans include areas such as establishment of unique equipment number systems, equipment labeling, and procedures for jumper and lifted leads.

- Establishment of an effective systems engineering organization that provides needed support to operations is an important interface between engineering and operations.

- Establishment of an effective construction turnover process is an important element that supports upgrading the Conduct of Operations at Tank Farms.

- Installation of continuous vapor monitoring systems in selected tank farms is required to allow tank farms entry. Therefore, a tie-in exists with instrumentation.

6.1.6 CONTINGENCIES

- One major uncertainty with the Conduct of Operations action planning involves the outcome of the efforts to define an interim safety basis (FY 1993) and later a final safety basis (FY 1996). In each case, identification of new safety concerns or new OSRs can affect the Conduct of Operation action plan.

- The Conduct of Operations action plan cannot account for new issues that may be identified by future event investigations, internal self-assessments, or

external compliance evaluations. If new program weaknesses are identified by future assessments, the action plan will need to be revised accordingly.

6.1.7 SCHEDULE

Refer to Figure 6.1-1.

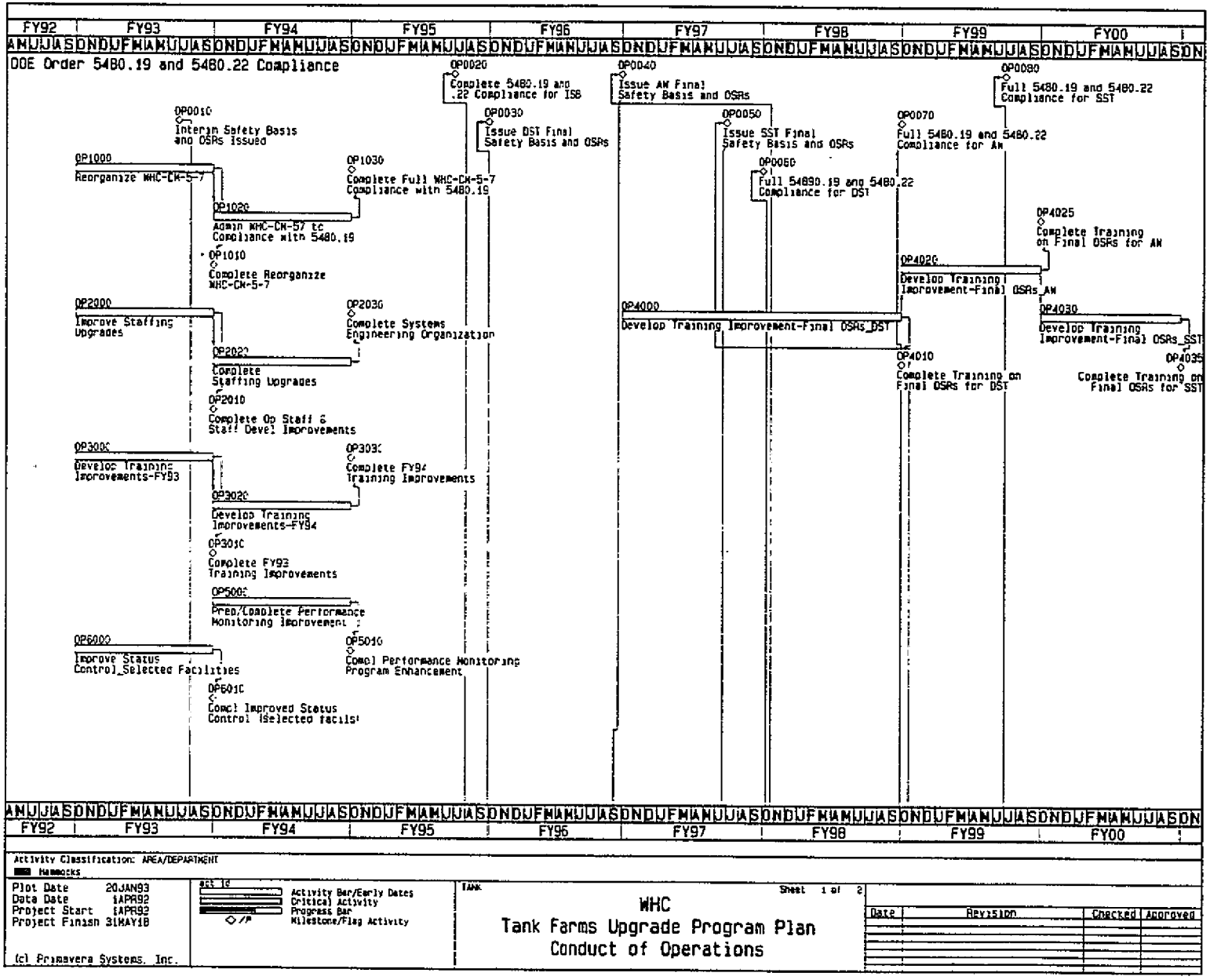
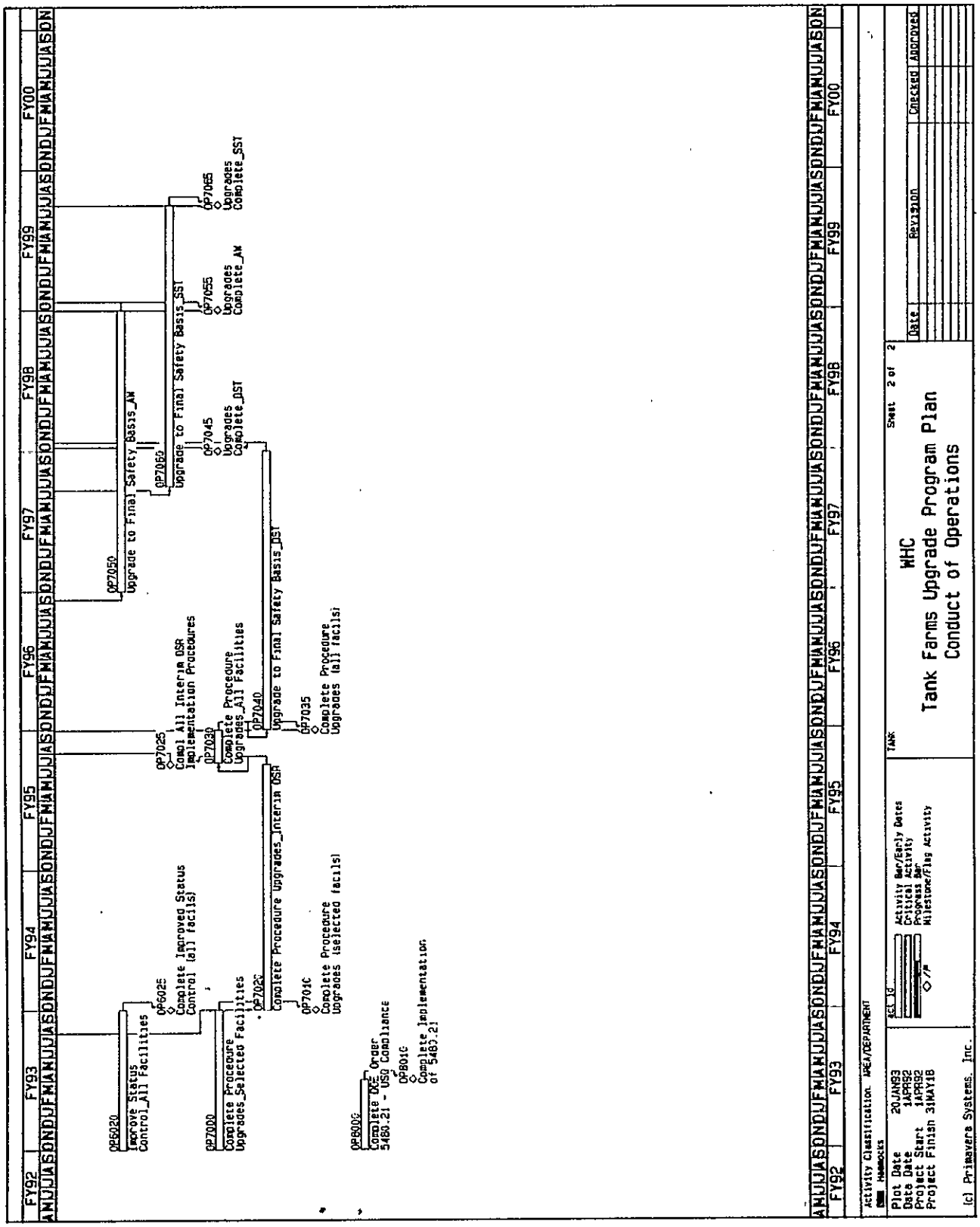


Figure 6.1-1. Conduct of Operations Schedule

Figure 6.1-1. Conduct of Operations Schedule



6.2 MAINTENANCE MANAGEMENT PROGRAMS

6.2.1 GOAL

The goal of the Maintenance Management Program action plan is to maintain Tank Farms operational safety, worker health, environmental protection and compliance, property preservation, and cost effectiveness.

6.2.2 SUMMARY ACTION PLAN

The U.S. Department of Energy (DOE) Order 4330.4A[1], *Maintenance Management Programs*, provides programmatic maintenance requirements to be implemented at DOE facilities. The Tank Farms maintenance organization has prepared a maintenance implementation plan (MIP) that provides a blueprint for a disciplined approach to implementation and compliance with the requirements of DOE Order 4330.4A at Tank Farms facilities.[2] The MIP is a living document that is updated periodically. This action plan provides a summary of the MIP document.

The Tank Farms approach to maintenance program upgrades is to rank the various elements of DOE Order 4330.4A and to place each element into one of three phases for implementation:

- Phase I - Critical infrastructure upgrades
- Phase II - Maintenance program upgrades
- Phase III - Maintenance program upgrades

6.2.2.1 Phase I - Critical Infrastructure Upgrades. Phase I includes elements of DOE Order 4330.4A implementation that must be accomplished first to provide critical infrastructure on which to build a successful maintenance program. In general, Phase I

[1]DOE, 1990, *Maintenance Management Program*, DOE Order 4330.4A, U.S. Department of Energy, Washington, D.C.

[2]Verwick, D. P., 1992, *Maintenance Implementation Plan for the waste Tank Maintenance and Production Management*, WHC-SP-0550, Westinghouse Hanford Company, Richland, Washington.

actions are scheduled for completion in FY 1993 and early FY 1994. Phase I elements include the following:

Maintenance Organization and Administration

Upgrades of maintenance organization and administration ensures a high level of performance through effective control of maintenance activities. A Tank Farms maintenance strategy will be developed based on an integrated approach to maintenance. The strategy will describe working relationships of interacting organizations, as well as personnel and procedural interfaces. The strategy will also describe the responsibility, authority, and accountability of the supporting organizations. Maintenance-specific policies and procedures will be developed and implemented that define organizational roles and responsibilities and the relationship between facility policies, maintenance policies, and implementing procedures.

Additionally, programs will be implemented to ensure a sufficient staff of qualified maintenance personnel is maintained. Management will establish the criteria for selecting, training, qualifying, and defining how personnel are used. Management will ensure that maintenance personnel understand and acknowledge their personal level of accountability and that expectations are well communicated and understood by all.

Training and Qualification of Maintenance Personnel

Organizational responsibilities for training will be defined and maintenance training programs will be developed based on systematic job task analysis for each job description.

Maintenance Procedures

Significant upgrades to maintenance procedures will be necessary to achieve compliance with DOE Order 4330.4A. Maintenance procedures will be written or revised for any component or system that has safety significance, degrades facility reliability, or is associated with personnel or equipment hazard. A formal procedures writing guide will be implemented. Also, a formal process for review, verification, and validation will be developed to ensure that procedures can be implemented in the field. A process for periodic review and updating of procedures will be implemented.

Planning, Scheduling, and Coordination of Maintenance

Improved scheduling processes that more effectively address facility priorities and control of the work backlog will be established. Training of personnel tasked with work coordination will be conducted.

Control of Maintenance Activities

Documentation improvements will be implemented to strengthen the work control process for "as-found" conditions and the work package closeout process.

Postmaintenance Testing

A postmaintenance testing program will be developed for Tank Farms equipment and facilities. The program will include definition of testing requirements based on the type of maintenance performed, controlling procedures, acceptance criteria, and documentation requirements.

Management Involvement

Programs will be implemented that ensure appropriate involvement of maintenance management and supervision involvement with facility operation, day-to-day maintenance activities in the field, monitoring of performance indicators, and effective horizontal and vertical communication. This element also includes programs to conduct performance-based self-assessments of overall maintenance program effectiveness and compliance with DOE Order 4330.4A and applicable industry standards.

6.2.2.2 Phase II - Maintenance Program Upgrades. Phase II elements require Phase I elements as a prerequisite to their completion and/or completion of other actions by functions such as plant engineering or quality assurance. Phase II elements include the following:

Maintenance Facilities, Equipment, and Tools

Upgrades of maintenance shop space, laydown areas, equipment storage areas, and office space to support maintenance staff and maintenance activities will be implemented. Engineering analysis of facility and equipment needs is in progress.

Types of Maintenance

Upgrades will be implemented to establish a proper balance between corrective and preventive maintenance to provide a high degree of confidence that facility equipment degradation is identified and corrected, that equipment life is optimized, and that the maintenance program is cost effective.

This element involves major programmatic improvements including development of a unique equipment numbering system, a master equipment list (MEL), equipment safety classifications that provide a basis for a graded approach to maintenance, and effective preventive and predictive maintenance programs.

Material Receipt, Inspection, Handling, Storage, Retrieval, and Issuance

Sitewide procedures will be consolidated for all phases of receiving, inspection, handling, storing, retrieving, and issuing of equipment, parts, and materials from the time an item is received until it is installed in the facility. This consolidation will achieve compliance with DOE Order 5700.6C, *Quality Assurance*.[3]

Maintenance Tools and Equipment

Methods will be established for storage, issuance, and maintenance of an adequate and readily available supply of maintenance tools and equipment.

Facility Condition Inspection

A comprehensive program will be developed for the inspection and assessment of facility conditions. Standards and training for inspection will be implemented.

Modification Work

Administrative controls for the implementation of modification work will be developed and applied to Tank Farm facility maintenance activities.

6.2.2.3 Phase III - Maintenance Program Upgrades. Phase III elements require completion of prerequisite elements in Phases I and II.[4] Phase III elements include the following:

Maintenance History

Develop a maintenance history and trending program to document data, provide historical information for maintenance planning, and support maintenance and performance trending of facility systems and components. Completion of a MEL and a unique numbering system for each structure, system, and component are essential for the development of a viable database.

Analysis of Maintenance Problems

Implement program upgrades to provide for systematic analysis of maintenance-related occurrences to determine root causes and to identify corrective actions necessary to prevent recurrence.

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[3]DOE, 1991, *Quality Assurance*, DOE Order 5700.6C, U.S. Department of Energy, Washington, D.C.

[4]See Note 1.

6.2.2.4 Graded Approach to Maintenance. A graded approach to maintenance will be used that involves separating systems and components into four categories:

- Safety systems, safety class items, and related equipment, including all equipment identified by the safety equipment list.
- Production-related systems and equipment
- Facility support and related equipment
- Facility preservation.

The categories are used to establish the level of detail, quality controls, and documentation that must be applied to maintenance of equipment. For a more detailed discussion of the four categories, see *Maintenance Implementation Plan for the Waste Tank Maintenance and Production Management.*[5]

6.2.3 JUSTIFICATION

Because of the chemical and radiological hazards associated with Tank Farms, equipment and structures must be maintained to ensure system design and operational safety requirements (OSRs) are met reliably. Protection against the facility hazards requires maintaining the integrity (leak tightness) of piping, ventilation systems, tanks, pumps, valves, walls, and other barriers. Proper functioning of instrumentation and controls is essential to process safety and safe storage of waste materials. Electrical power distribution must be maintained at a high level of reliability and service.

The overall material condition of the facilities must be upgraded to and maintained at acceptable levels so that operations personnel are not forced to work with equipment that does not function as intended. Housekeeping is important to facility safety. Work areas must be kept clean and free of debris and clutter.

The ability of WHC to meet overall safety and program objectives for storage and processing of wastes depends on maintenance programs and the actions of maintenance and support personnel. Approved policies and procedures form the basis of management and quality programs; adherence to these approved documents is required for safety and to achieve program objectives.

[5]See Note 2.

Currently upgrades are required in the maintenance area to achieve compliance with requirements contained in DOE Order 4330.4A, *Maintenance Management Programs* and DOE Order 5700.6C, *Quality Assurance*.[6]

6.2.4 MILESTONES

General Maintenance Program Requirements (DOE Order 4330.4A)

- Develop and maintain a MEL that identifies all equipment associated with facility structures, systems, and components. (Note: Interim safety equipment lists have been developed for double-shell, single-shell, and aging-waste storage tanks and for the evaporator.) - Phase II (1997).

- Perform an engineering risk analysis on all equipment in the MEL and categorize equipment into four importance categories (see Section 6.2.2.4). The categories provide the basis for a graded maintenance approach - 1997.

- Implement an interim graded approach to categorization until each formal engineering risk analysis is completed - TBD.

- Implement a process whereby future facilities and equipment are added to the MEL - TBD.

- Conduct biannual maintenance program self-assessments based on the elements listed in DOE Order 4330.4A - ongoing.

Maintenance Organization and Administration

- Develop a hierarchy of policies and procedures that addresses maintenance programs. Develop cross-references for these policies and consolidate maintenance policies where practical - September 31, 1993.

- Develop a strategy based on an integrated approach to maintenance with long-range planning and accurate funding and staffing requirements as the cornerstones - June 30, 1993.

- Develop and implement formalized criteria in the form of policies and procedures for the selection, training, and qualification of maintenance personnel - March 30, 1993.

[6]See Notes 1 and 2.

Training and Qualification of Maintenance Personnel

- Define the responsibility of the maintenance and training organizations related to the identification, development, and implementation of essential training and qualification programs - March 30, 1993.

- Perform a job analysis for each job description and document baseline training requirements - March 30, 1994.

- Incorporate specific training requirements in the training recall system - April 30, 1994.

- Develop a formal on-the-job training program and document the requirements in an implementing procedure - March 30, 1993.

- Develop and implement procedures that identify qualification requirements for persons assigned specific work - April 30, 1994.

- Train a core group of maintenance engineers in standard methods of root cause analysis. Develop a program that will ensure that an adequate number of maintenance staff trained in root cause analysis are available - February 28, 1993.

- Procedures will be implemented that require management to measure the effectiveness of training programs and to provide feedback to the training organization - September 30, 1992 (complete).

Maintenance Equipment, Facilities, and Tools

- Implement initial maintenance requirements for shop space, laydown areas, equipment storage, and office space - mid-1993.

- Perform engineering study of additional facilities, tools, and space requirements - Phase II (TBD).

Types of Maintenance

- Perform a systematic analysis to determine preventive maintenance tasks to be performed on MEL items. Develop and implement methods for determining preventive maintenance frequencies - Phase II (TBD).

Maintenance Procedures

- Develop formal instructions for the development and writing of procedures (e.g., format, level of detail) - Completed.

- Develop a formal process for procedure review and verification - March 30, 1993.

- Establish a formal periodic review of procedures (as part of the procedure control process) - March 30, 1993.

Planning, Scheduling, and Coordination of Maintenance

- Establish and train a dedicated planning staff to support maintenance activities - March 30, 1993.

- Revise the scheduling process to address plant priorities more effectively, including effective control of the work backlog - March 30, 1993.

- Train personnel tasked with work coordination responsibilities - December 31, 1993.

- Develop a formal process defining planned and forced outages - December 31, 1993.

Control of Maintenance Activities

- Develop and implement requirements to document as-found conditions and actions to correct the item as part of the work request system - December 31, 1993.

- Improve the work package closeout process; shorten the time required and provide a feedback loop to planning that identifies problems encountered in the work package - December 31, 1993.

Postmaintenance Testing

- Develop and implement a postmaintenance testing program, test requirements, and procedures that address the elements of DOE Order 4330.4A - December 31, 1993..

- Ensure that criteria for performance, documentation, and acceptance are incorporated in the postmaintenance program - December 31, 1993.

Material Receipt, Inspection, Handling, Storage, Retrieval, and Issuance

- Consolidate existing Sitewide procedures or reference them in a single facility-specific procedure - Phase II (TBD).

Control and Calibration of Measuring and Test Equipment

- Reevaluate and upgrade existing procedures to ensure that adequate control of measuring and test equipment (M&TE) is maintained at all times. Implement a logging system for M&TE that ties each piece of M&TE to the equipment it was used to check or calibrate - December 31, 1993.

- Develop and implement procedures that describe what actions shall be taken when M&TE that is in service is found to be out of calibration, defective, or otherwise unreliable - December 31, 1993.

Maintenance Tools and Equipment

- Consolidate or reference in a single document procedures for use, storage, issuance, and maintenance of tools and equipment used in support of maintenance activities - Phase II (TBD).

Facility Condition Inspection

- Implement a comprehensive program for the inspection and assessment of facility conditions. Identify standards and develop training for inspection personnel - Phase II (TBD).

Management Involvement

- The maintenance manager will document the expectations for upper-level managers and first-line supervisors to spend time in the field monitoring work in progress - December 31, 1993.

- Develop and implement procedures that describe the maintenance program review process, including tools such as inspections, audits, and self-assessments - March 31, 1994.

Maintenance History

- Develop and implement a maintenance history program that provides historical data relevant to safety, critical process and high-value structures, systems, and components (Note: Development of a unique equipment numbering is an essential prerequisite to this milestone.) - Phase III (TBD).

Analysis of Maintenance Problems

- Develop and implement a formal program for the systematic analysis of maintenance problems that result in unplanned occurrences. This program will include information collection, event analysis, root cause determination, corrective action follow-up, and generic follow-up - Phase III (TBD).

6.2.5 TIE-INS

- Engineering is providing a risk analysis and categorization of equipment that is a key prerequisite to the graded maintenance approach and to completion of several planned maintenance program upgrades (Section 6.4).

- Upgrades of maintenance facilities and office space for maintenance staff is an important support element associated with the Facilities action plan (Section 6.12).

- Development of a MEL and the unique equipment numbering system by plant engineering (configuration management) are critical interfaces that support planned maintenance program upgrades (Section 6.3).

- The interface with procurement is an important issue to ensure proper selection of vendors, commercial-grade procurement of safety-related parts, and adequate vendor quality assurance.

6.2.6 CONTINGENCIES

- Completion of equipment safety categorization is an uncertainty that can significantly affect implementation of maintenance upgrades. The program will not be changed significantly, but resource requirements, facility needs, and staffing requirements can be affected if safety concerns and additional equipment required for safe operation are identified.

- The current action plan does not contain contingency resources to deal with any program weaknesses that might be identified in future maintenance program self-assessments or independent compliance audits.

6.2.7 SCHEDULE

Refer to Figure 6.2-1.

Figure 6.2-1. Conduct of Maintenance Schedule.

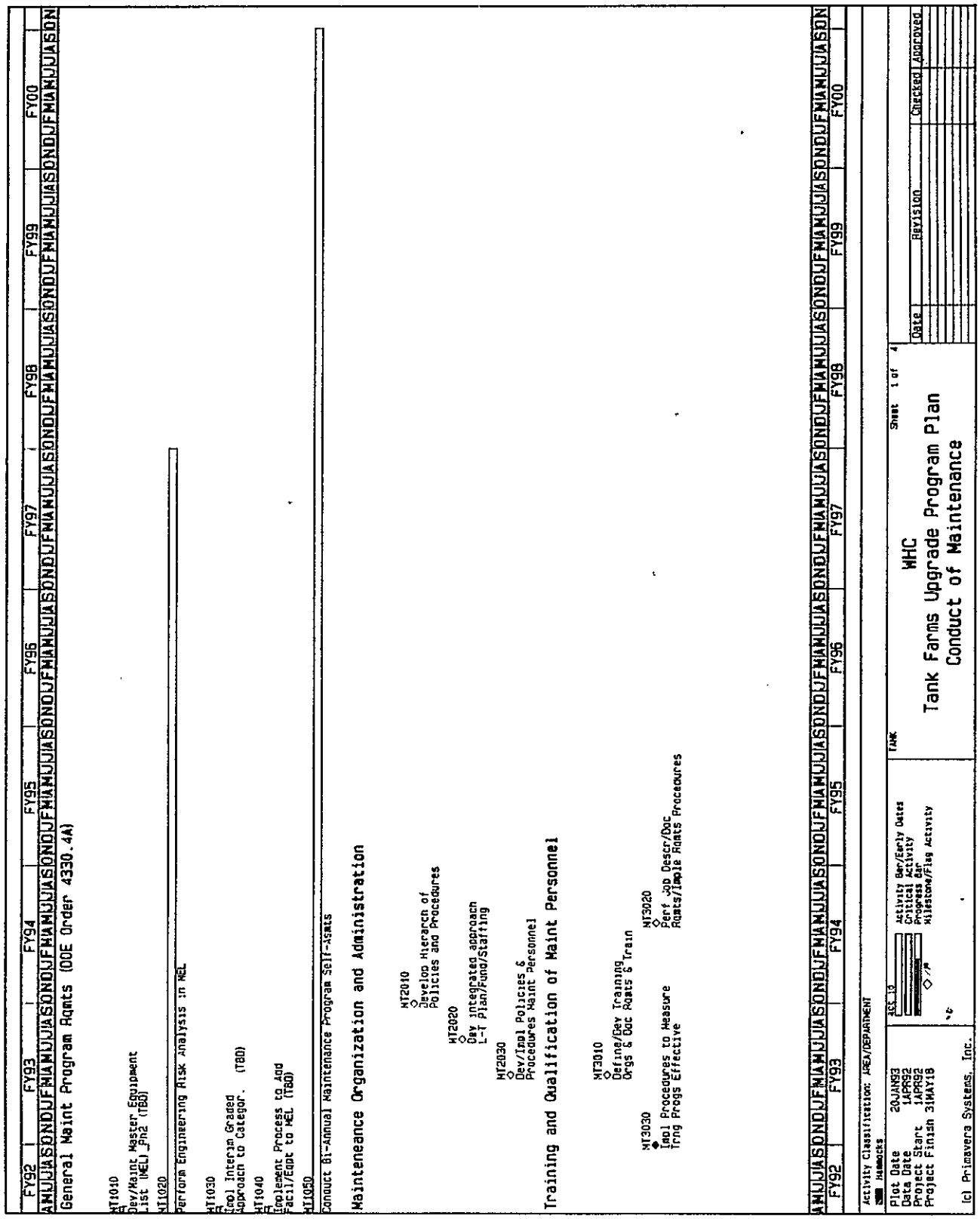


Figure 6.2-1. Conduct of Maintenance Schedule.

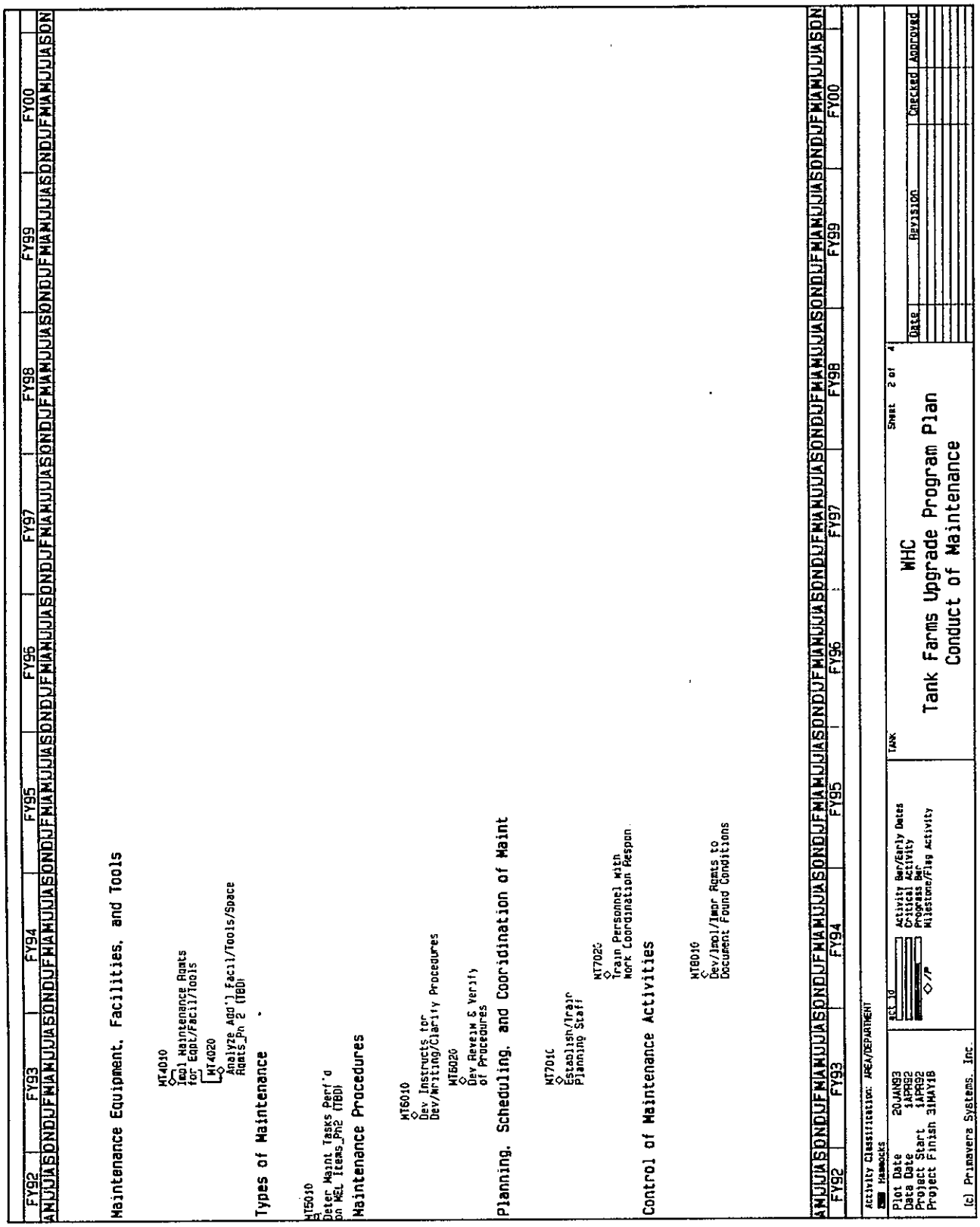


Figure 6.2-1. Conduct of Maintenance Schedule.

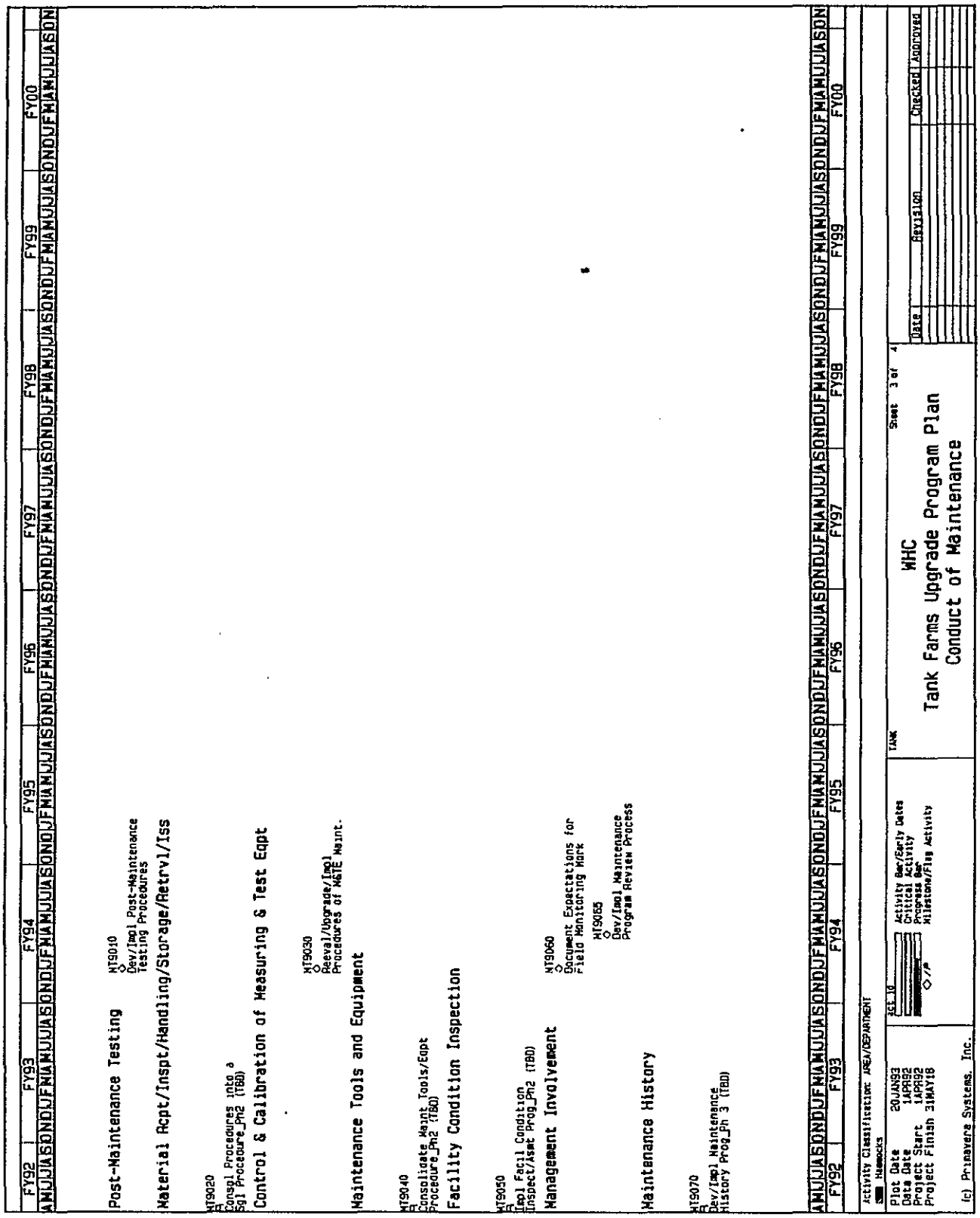
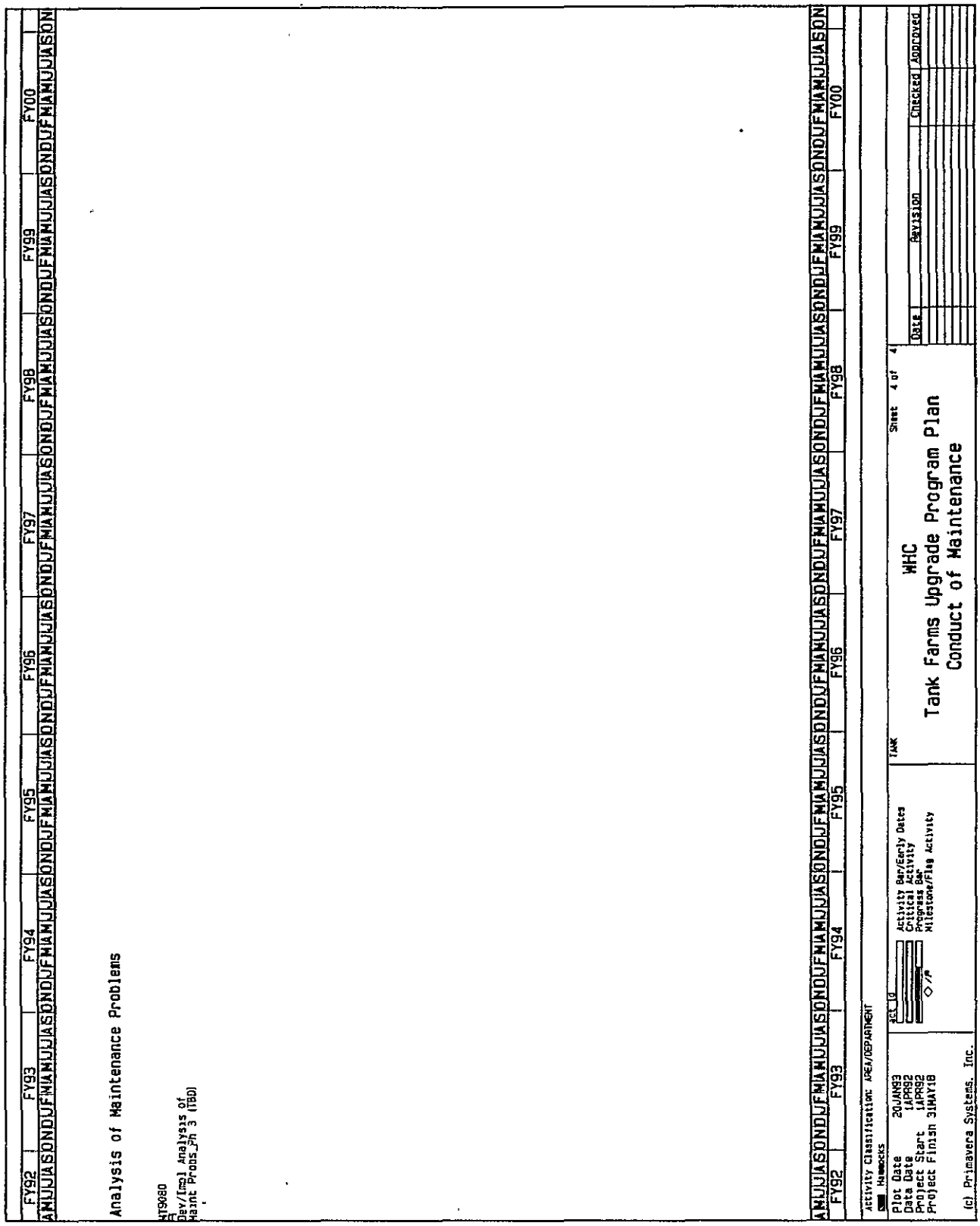


Figure 6.2-1. Conduct of Maintenance Schedule.



6.3 CONFIGURATION MANAGEMENT

6.3.1 GOAL

Tank Farms has three goals for Configuration Management:

- Establish organizational structure and procedural requirements for reconstituting the design basis and controlling changes to it.
- Identify plant physical and functional characteristics that do not conform to the design basis and establish programs for corrective action.
- Establish material condition and aging as a specific program element.

Configuration Management is defined as an integrated process that identifies existing plant design requirements and controls changes to ensure the following:

- Selected plant structures, systems, components, and computer software conform to the approved design requirements
- Plant physical and functional characteristics are reflected accurately in selected plant documents (e.g., design, procurement, operating, testing, maintenance, and training).[1]

Configuration Management is an element of Conduct of Engineering but is addressed separately in this document for emphasis. Configuration Management is made up of five program elements: (1) program management; (2) design and design requirements, including reconstituting the design basis; (3) design change control; (4) design document control; and (5) assessments, including material condition and aging.

6.3.2 SUMMARY ACTION PLAN

- Update technical and administrative procedures to conform with the new organizational structure and upgraded requirements for Configuration Management (i.e., design and document control)

[1]INPO, 1987, *Report on Configuration Management in the Nuclear Industry*, INPO 87-006, Institute of Nuclear Power Operations, Atlanta, Georgia.

- Establish training program and complete training of engineering and administrative personnel regarding Configuration Management requirements

- Establish and implement design basis reconstitution (DBR) program and update design documents

  - Establish approved design basis documentation for the Tank Farms.
  - Determine as-built configuration of Tank Farms with respect to approved design bases documentation and restore to approved design basis. Current plans are to field verify those drawings required to support safe operation and maintenance of Tank Farms systems, structures, and components (SSCs) (essential drawings).
  - Implement component labeling program.
  - Develop master equipment list (MEL)
  - Develop safety equipment list (SEL)
  - Develop system design description

- Establish and implement material condition and aging (MCA) program. Current plans include implementation of a life extension program, which provides substantial compliance with U.S. Department of Energy (DOE) requirements.

- Identify plant physical and functional characteristics that do not conform to the reconstituted design basis and provide input to design engineering and/or plant maintenance for corrective action.

6.3.3 JUSTIFICATION

One significant safety issue associated with older nuclear facilities are inadequately documented and maintained design bases. A complete and fully documented design basis is required to support the facility safety analysis reports (SARs), which define the envelope of safe operations and are used to identify and evaluate potential unreviewed safety questions (USQs). Without a complete and fully documented design basis, an accurate safety basis cannot be developed or maintained. In addition, a complete and fully documented design basis is required to support effective facility operations, preventative and corrective maintenance, and to provide the basis for proposed design modifications. At the Hanford Site, most of Tank Farms SSCs are old, and their designs are not fully documented and maintained by current standards.

DBR will be a large effort. As discussed previously, the design of SSCs include applicable design criteria, drawings, specifications, calculations, instrumentation setpoints, and special testing and operating requirements. Although a DBR program should be completed as a prerequisite to establishing interim and final safety bases, full funding has not been provided to date. Current funded plans related to DBR require only field verification of

essential drawings. While this activity will result in a substantial improvement in Tank Farms design documentation, it does not represent a complete DBR program.

Another significant but related safety issue associated with older nuclear facilities is the capability of life-limited components to continue to meet their design requirements because of age-related degradation. Age-related degradation of SSCs can result in failure to meet the assumptions of the safety analyses and/or failure to support cost-effective operations. Age-related degradation of Tank Farms SSCs has been a significant problem, and a life extension program has been initiated. The WHC Tank Farm life extension program should be evaluated against the DOE requirements for an MCA program and upgrades should be initiated as appropriate.

6.3.4 MILESTONES

- Implement component labeling program for Tank Farms SSCs
  - AN and SY Tank Farms - End fiscal year (FY) 1993
  - Remaining Tank Farms - End FY 1997
- Develop MEL for Tank Farms SSCs
  - Interim MEL - June 1993
  - Final MEL - End FY 1997
- Develop SEL for Tank Farms SSCs
  - Interim SEL - June 1993
  - Final SEL - Mid-FY 1997
- Field verify Tank Farms essential and related drawings
  - AN and SY Tank Farms - End FY 1993
  - Remaining Tank Farms - End FY 1998
- Complete DBR program for Tank Farms - End FY 1998
- Upgrade WHC life extension program for Tank Farms SSCs - End FY 1994

6.3.5 TIE-INS

Configuration Management is an element of Conduct of Engineering. Thus, this action plan is an integral part of the Conduct of Engineering action plan.

- DBR ties-in with the conduct of operations, conduct of engineering, and safety documentation upgrades
- Development of MEL and the unique equipment numbering system are important interties with conduct of operations and maintenance management programs
- An important interface exists between configuration management, conduct of engineering, and training for the establishment and implementation of configuration management training for engineers
- Essential field-verified drawings are required to support SAR development (safety documentation).

6.3.6 CONTINGENCIES

Failure to fund these Configuration Management upgrades adequately would delay completion of the DBR program, which would affect the Conduct of Operations and Conduct of Maintenance action plans and affect completion of the Safety Program documentation upgrades.

6.3.7 SCHEDULE

Refer to Figure 6.4-1 (Section 6.4, Conduct of Engineering).

6.4 CONDUCT OF ENGINEERING

6.4.1. GOAL

The goal of Conduct of Engineering is to ensure that the technical support necessary for the safe and efficient operation, maintenance, and modification of the Tank Waste Remediation System (TWRS) is provided in a quality and timely manner. This technical support includes the TWRS engineering staff and outside engineering organizations. Upgrade goals include clearly defined responsibilities and interfaces for all engineering functions supporting TWRS, sufficient highly competent technical resources, fully functional engineering procedures, and effective performance monitoring of engineering products and services provided to TWRS.

Conduct of Engineering is defined as the technical activities required to design, construct, test, operate, and maintain a system, structure, or component (SSC) over its lifetime.

- Design and design modifications, including temporary modifications, as set forth by
  - Design criteria and requirements
  - Drawings and vendor manuals
  - Specifications
  - Calculations and analyses
  - Instrument setpoints and operational safety requirements
  - Postinstallation testing and inspection requirements
  - Special operating procedures and configurations
- Design review, verification, and validation
- Technical support for the operating organization to assist in meeting production goals while staying within the design envelope, including diagnosis of unusual operational occurrences, corrective action, and root cause analysis

- Technical support for the maintenance organization to establish the required scope and frequency of preventative maintenance and to establish performance indications for corrective maintenance[1,2]

- Performance monitoring of the engineering organization to assess the technical quality and timeliness of engineering services and products.

Currently, Westinghouse Electric Corporation (Westinghouse) is preparing a Conduct of Engineering manual for its government-owned and contractor-operated (GOCO) operations. This manual, when issued, is expected to include the most significant elements of the Institute of Nuclear Power Operations (INPO) documents, although some difference in detail will likely occur.

6.4.2 SUMMARY ACTION PLAN

- Receive Westinghouse GOCO Conduct of Engineering manual

- Revise engineering organization to comply with Conduct of Engineering manual. Engineering functions to address include the following:

  - Design
  - Process
  - Systems
  - Maintenance
  - Project
  - Reliability
  - Procurement
  - Safety and quality assurance.

- Establish a performance monitoring process for assessing performance of the engineering organization and effecting improvements where appropriate.

[1]INPO, 1990, *Conduct of Engineering*, INPO 90-009, Institute of Nuclear Power Operations, Atlanta, Georgia.

[2]INPO, 1990, *Performance Objectives and Criteria for Operating and Near-Term Operating License Plants*, INPO 90-015, Institute of Nuclear Power Operations, Atlanta, Georgia.

- Acquire engineering resources of appropriate expertise and/or establish training program to develop required expertise. Personnel with engineering responsibility will have appropriate expertise by engineering discipline (e.g., mechanical engineer, civil engineer) or area of special consideration (e.g., as low as reasonably achievable [ALARA], fire protection). Acquired resources may be employees or contracted services.

  - Upgrade training program and complete training of engineering personnel
  - Procure engineering services to supplement peak staffing needs

- Develop and/or update engineering administrative and technical procedures that establish interface requirements, define the design process and design controls, and address design review and verification requirements, including multidiscipline review where appropriate.

- Establish lessons-learned process for Tank Farms that addresses lessons from Tank Farms operations, Hanford Site operations, other DOE Site operations, and lessons from the commercial nuclear industry.

- Provide technical support to the operating, maintenance, and training organizations.

- Implement the Configuration Management action plan.

- Develop design modifications and/or upgrades to restore SSCs to the approved design basis, to support the safety program, and to support the waste cleanup mission.

6.4.3 JUSTIFICATION

Some revision of Westinghouse Hanford Company (WHC) engineering is planned as a result of National Academy of Science, Defense Nuclear Facility Safety Board, Tiger Team, and external reviews, as well as internal self-assessments. Current actions are based on a Conduct of Engineering model presented by INPO in a number of documents.[3,4,5] Because

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[3]See Notes 1 and 2.

[4]INPO, 1985, *Guidelines for Conduct of Technical Support Activities of Nuclear Power Stations*, INPO 85-31, Rev. 01, Institute of Nuclear Power Operations, Atlanta, Georgia.

[5]INPO, 1985, *Use of System Engineers*, INPO 85-33, Institute of Nuclear Power Operation, Atlanta, Georgia.

the INPO documents address Conduct of Engineering for commercial reactors, some tailoring of the organizational model may be appropriate for Tank Farms application.

Additionally, the Westinghouse GOCO Conduct of Engineering manual is expected to include the most significant elements of the INPO documents, although some difference in detail is likely. Upon issuance of this manual, an implementation plan will need to be developed for WHC engineering. It is anticipated that such an implementation plan would address all of the current engineering functions with some enhancement in certain areas (e.g., reliability engineering).

DOE is expected to develop a Conduct of Engineering order as part of the 5480 series. If a new DOE order is implemented, it is unlikely that new requirements would be identified, so the above plans are considered appropriate at this time. However, upon issuance of any DOE Conduct of Engineering order, an implementation plan will be developed.

Current plans for engineering reorganization include transferring ultimate responsibility for technical adequacy of systems from cognizant engineers to system engineers. Design modifications and upgrades will be performed by design engineers for the system engineers. Further organizational upgrades may be defined upon release of the Westinghouse GOCO Conduct of Engineering manual.

6.4.4 MILESTONES

- Receive Westinghouse GOCO Conduct of Engineering manual - April 1993
- Prepare WHC implementation plan for GOCO Conduct of Engineering manual - fiscal year (FY) 1994
- Milestones for engineering activities that fall under Configuration Management are provided in that action plan (Section 6.3)

6.4.5 TIE-INS

Conduct of Engineering interfaces with all activities that result in design modifications and/or analyses of design characteristics. Elements of this action plan will likely result in revisions to the process for implementing such modifications and, therefore, should be implemented as early as possible. Tie-ins to Conduct of Engineering include the following:

- Configuration Management is an element of Conduct of Engineering. Thus the Configuration Management action plan is an integral element of this action plan.

- Restoration of Tank Farm SSCs to the current design basis will likely result in modifications to engineering documents and/or SSCs; either event results in modification to design and ties-in to Conduct of Engineering. Design modifications resulting from the restoration program may involve any of the design disciplines and/or any area of special design consideration. Restoration of the design basis ties-in with Conduct of Operation and Configuration Management.

- The safety program plan establishes an interim safety basis for Tank Farms. A final safety basis is then developed by preparing a final safety analysis report in accordance with DOE Order 5480.23.[6] Each of these efforts will likely result in required modifications and upgrades to design. Design modifications resulting from the safety program may involve any of the design disciplines and/or any area of special design consideration that affects safety. Development of an approved design basis, including field-verified drawings, is a complementary activity required to support development of the interim safety basis. In addition, development of a safety equipment list is a complementary activity to the interim update of the existing safety analysis report.

- Design modifications will be required to support the waste cleanup mission. Such design modifications may involve any of the design disciplines and/or any area of special design consideration.

- Technical support for the operating organizations to assist in productivity goals, design envelope, maintenance, and diagnostic of offnormal events are important inter-ties with Conduct of Operations.

- An important interface exists between Conduct of Engineering, Configuration Management, and training for the establishment and implementation of Configuration Management training for engineers.

- The co-location of engineering staff with operations and maintenance staff necessitates additional office space and ties-in with facilities upgrades.

[6]DOE, 1992, *Nuclear Safety Analysis Reports*, DOE Order 5480.23, U.S. Department of Energy, Washington, D.C.

6.4.6 CONTINGENCIES

Adequate staffing levels and training of the engineering staff are required to provide the level of engineering necessary to support the operating and maintenance organizations and to implement modifications and upgrades identified in this plan.

In addition, failure to implement the Configuration Management or delaying its completion would affect the Conduct of Operations and Conduct of Maintenance action plans and the completion of the Safety Documentation upgrades.

6.4.7 SCHEDULE

Refer to Figure 6.4-1. Because Configuration Management (Section 6.3) is an integral element of Conduct of Engineering, its activities are included in Figure 6.4-1.

Figure 6.4-1. Conduct of Engineering Schedule.

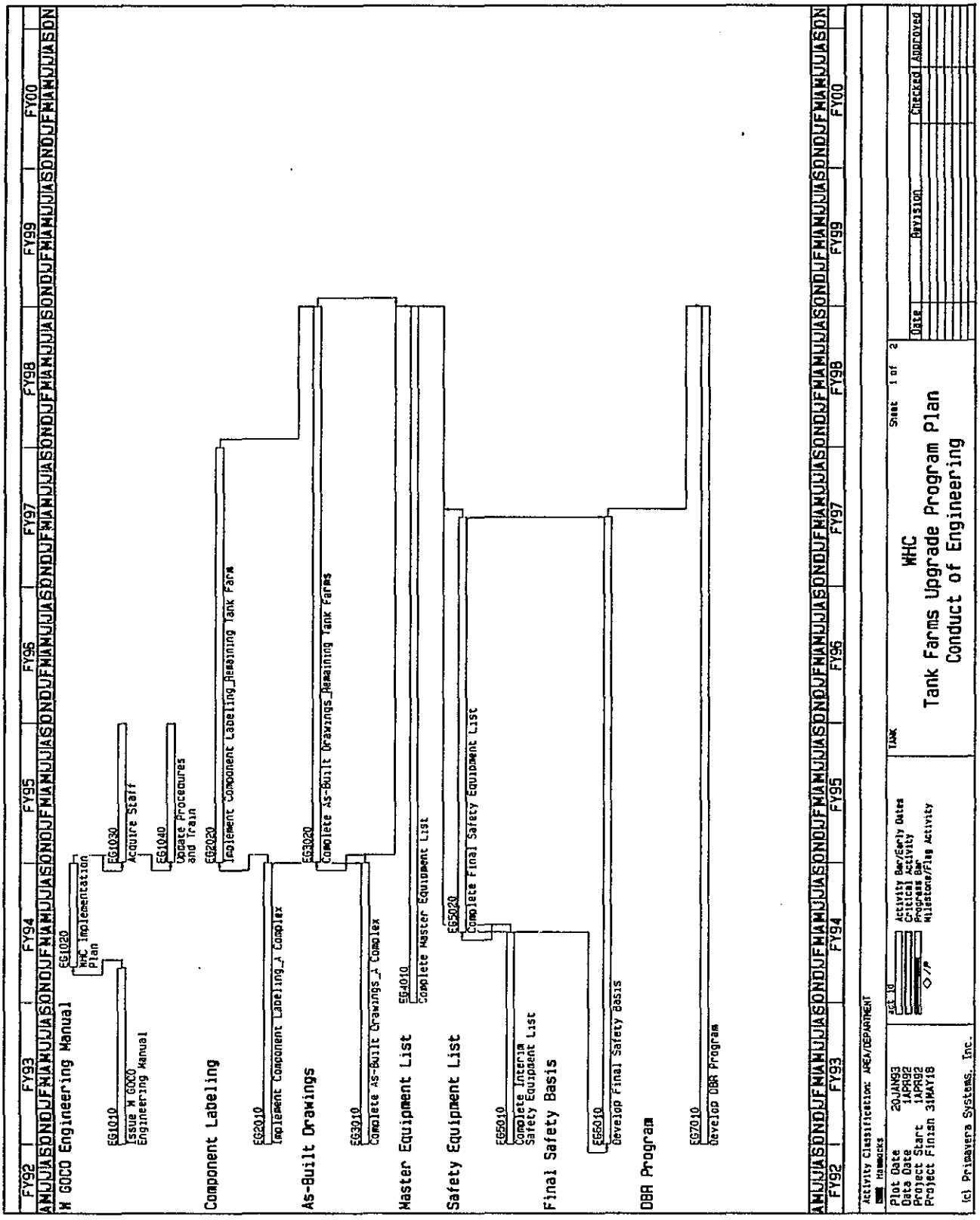
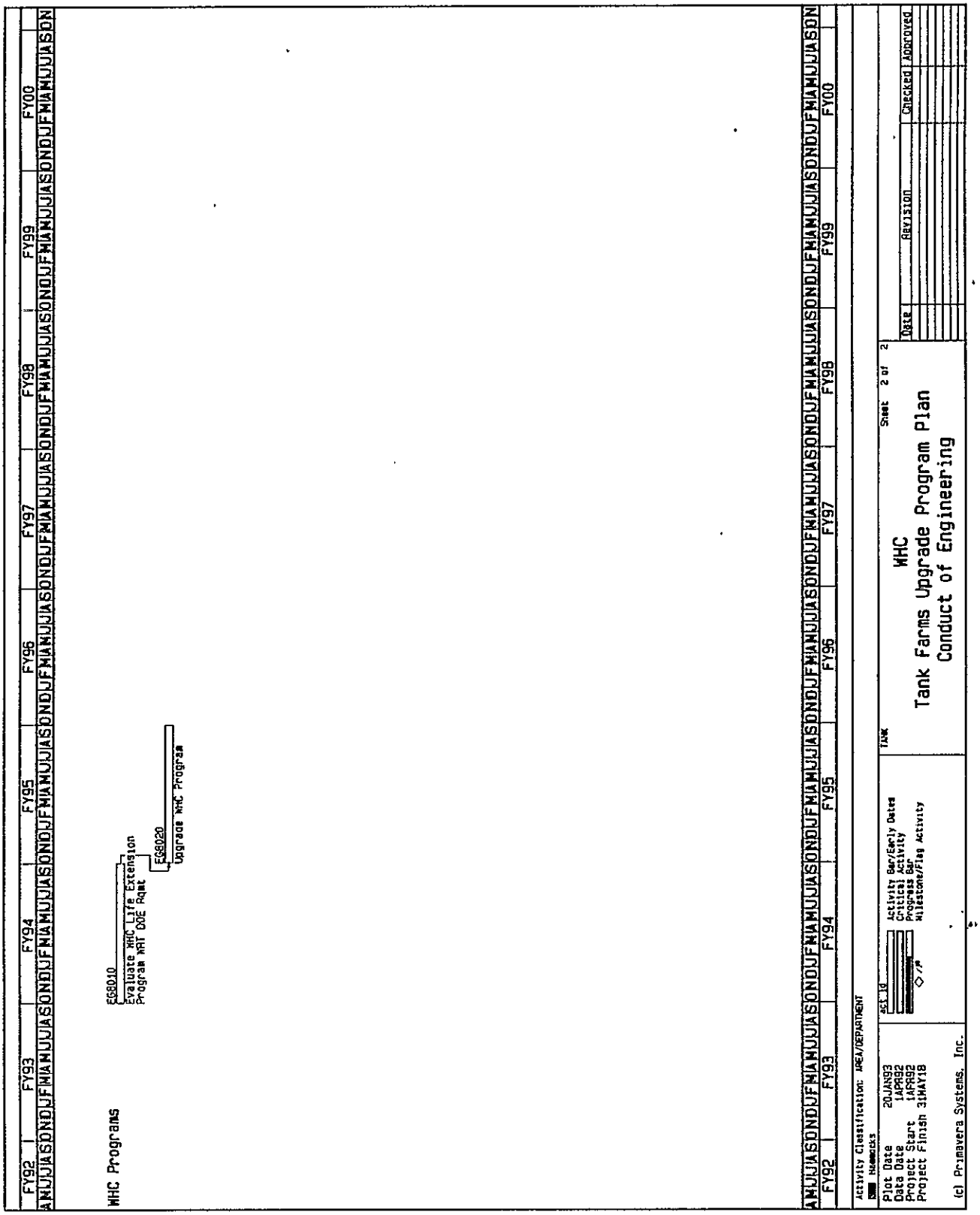


Figure 6.4-1. Conduct of Engineering Schedule.



6.5 TANK FARM TRAINING

6.5.1 GOAL

The Tank Farm Training action plan goal is to provide Tank Farm operations with training support through application of industry training standards and performance-based training (PBT) to ensure the following:

- Qualification programs are developed and implemented in an effective and reliable manner that is appropriate for the hazards and risk associated with the operation
- Qualification programs promote an awareness of the risks involved and a level of proficiency consistent with assigned tasks
- All persons are qualified to carry out their assigned responsibilities.

6.5.2 SUMMARY ACTION PLAN

Training support is based on the requirements of DOE Order 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities*[1], and will include a systematic approach to PBT. The basic elements of a PBT program include the following:

- Establish prerequisite standards of education, skills, and knowledge required for entry into the training program
- Conduct a systematic analysis of the job to be performed. Operating organizations will conduct a job and task analysis to identify training that provides the necessary skills and knowledge so that assigned tasks can be performed effectively. Initial and continuing training programs will be based on and traceable to the analysis. The analysis will include normal and emergency duties and place emphasis on the role of each member of the operating organization (and maintenance and technical support organizations as required) in ensuring safe operation. Because of the varied complexity and scope of job functions, the degree of analysis necessary to determine skill and

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[1]DOE, 1991, *Personnel Selection, Qualification, Training, and Staffing at DOE Reactor and Non-Reactor Nuclear Facilities*, DOE Order 5480.20, U.S. Department of Energy, Washington, D.C.

knowledge requirements may vary. For example, a job analysis will be conducted for operations and maintenance personnel; whereas a less formal assessment of training needs may be appropriate for technical support personnel.

- Design and develop training programs based on job performance requirements and standards.
- Implement training programs that contain instruction appropriate to job performance.
- Evaluate ability of trainees to meet job performance requirements and evaluate and revise training programs.

6.5.3 JUSTIFICATION

DOE objectives in creating DOE Order 5480.20 were to ensure the development and implementation of contractor-administrated training programs that provide consistent and effective training for personnel at DOE reactor and nonreactor nuclear facilities. PBT methodology has proven to be effective; PBT is required for selected facilities by DOE Order 5480.18A[2] and is recommended by DOE for the design and development of training programs at all DOE reactor and nonreactor nuclear facilities. In addition to training resulting from PBT methodology, DOE Order 5480.20 contains minimum prescriptive requirements that must be included in qualification programs.[3] The requirements contained in the order are based on DOE, Nuclear Regulatory Commission, and related industry standards, and are applicable to all DOE nuclear facilities.

6.5.4 MILESTONES

Training and Administration (September 1995):

- Develop and track training schedules
- Establish training program evaluations

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[2]DOE, 1991, *Accreditation of Performance Based Training for Category A Reactors and Nuclear Facilities*, DOE Order 5480.18A, U.S. Department of Energy, Washington, D.C.

[3]See Note 1.

- Establish compliance with DOE Orders 5480.18A[1], 5480.19[2], 5480.20[3]
- Train training management.

Initial Training:

- 242-A restart (December 1992)
- Material development (October 1993)
- Power operators (May 1994)
- Technical staff (October 1995)
- Emergency drill program (September 1995)
- New operators (March 1993)
- Systems training (October 1993)
- Instrumentation training (October 1995)
- Job-specific certifications (October 1995).

6.5.5 TIE-INS

- Conduct of Operations--Training is an integral part of Conduct of Operations.
- Configuration Management and Conduct of Technical Engineering--System-specific training depends on both historical design and development and up-to-date system modification data.

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[1]See Note 2.

[2]DOE, 1990 *Conduct of Operations Requirements for DOE Facilities*, DOE Order 5480.19, U.S. Department of Energy, Washington, D.C.

[3]See Note 1.

6.5.6 CONTINGENCIES

- Currently, Operations staffing is not sufficient to support the ongoing initial training program and the required retraining program as scheduled. Staffing must be increased or the training schedule will need to be extended. Factors influencing staffing needs include the following:

  - Number of different qualifications
  - Breadth of certification process
  - Total number of people to be trained
  - Types of jobs for which people will be trained.

- To provide the best support, tank farm training needs the various programs to be well developed (i.e., only a few and/or minor changes will occur). However, some training-related development (e.g., system descriptions, training aids) can begin in early stages of program development, allowing for more efficient use of time as training deadlines near.

- A process simulator for 242-A Evaporator operation using the same keyboard, consoles, and graphics found on the monitor and control system was proposed in April 1992. Staffing and funding to support the use of a simulator as a part of the training program have not been identified.

- Other factors affecting PBT include the following:

  - Availability of design documentation, procedures, safety-related documents, and other reference material
  - Availability of support facilities for conduct of training (e.g., classrooms, offices)
  - Technical review support, graphics preparation, and clerical support.

6.5.7 SCHEDULE

Refer to Figure 6.5-1.

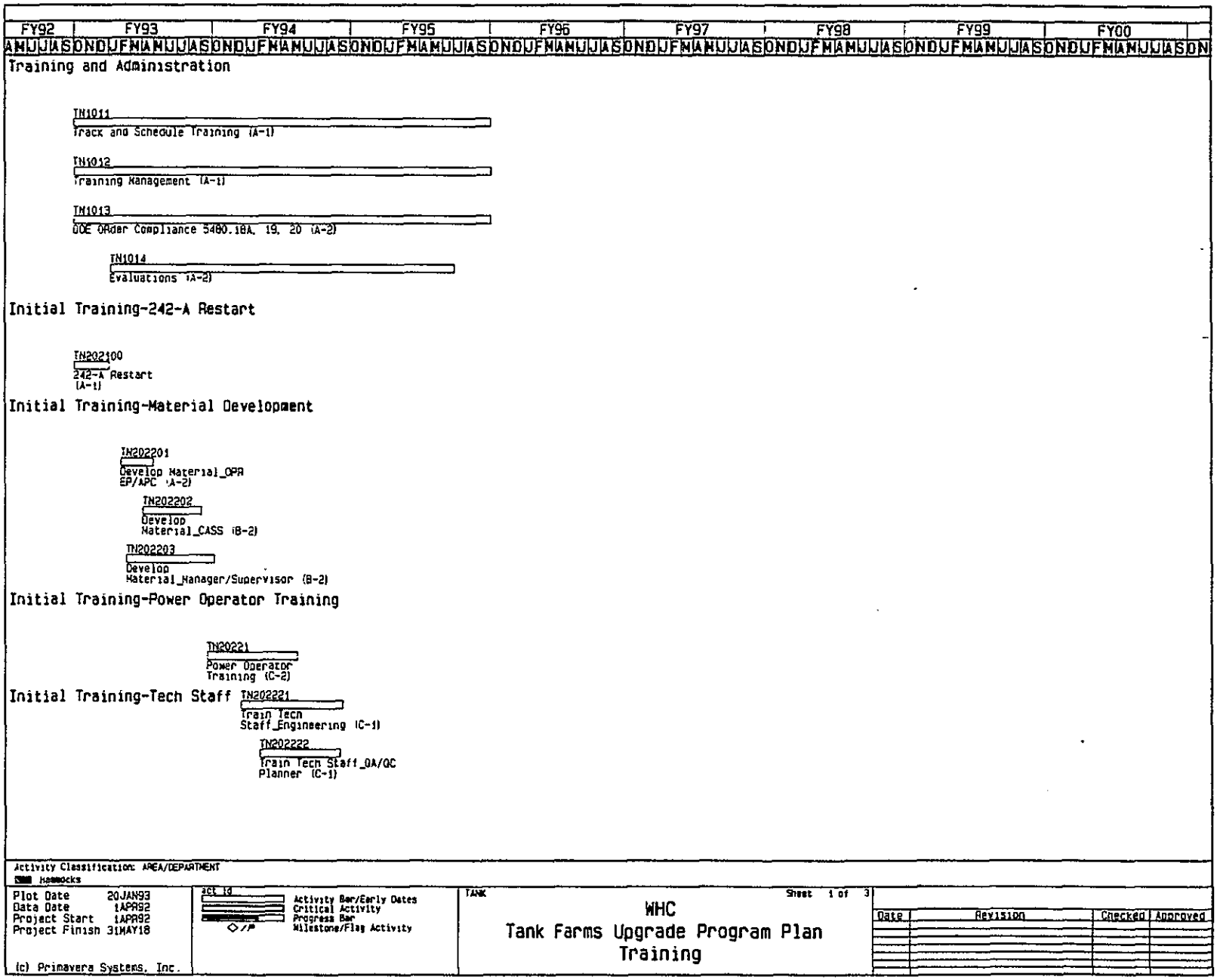


Figure 6.5-1. Training Schedule.

Figure 6.5-1. Training Schedule.

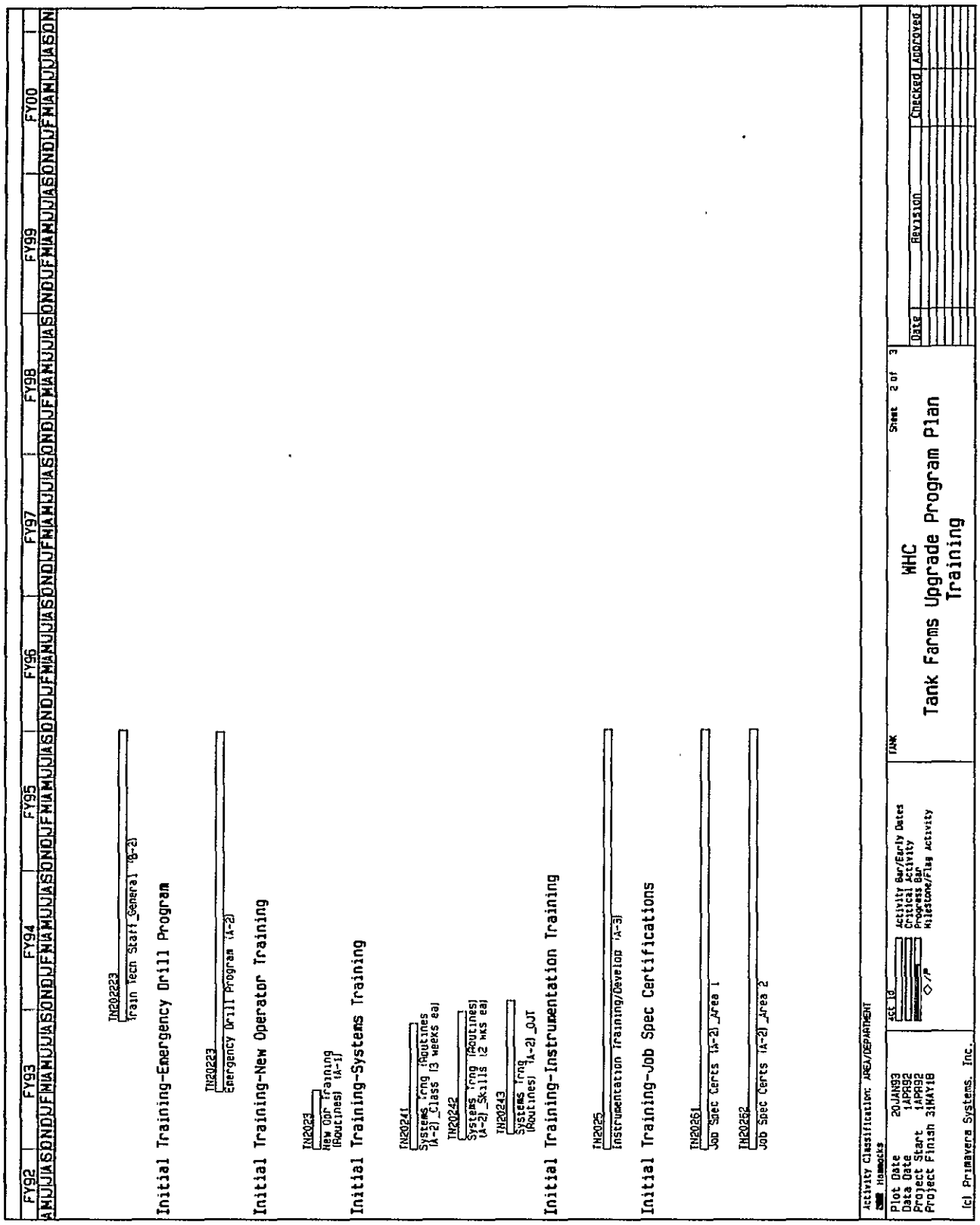
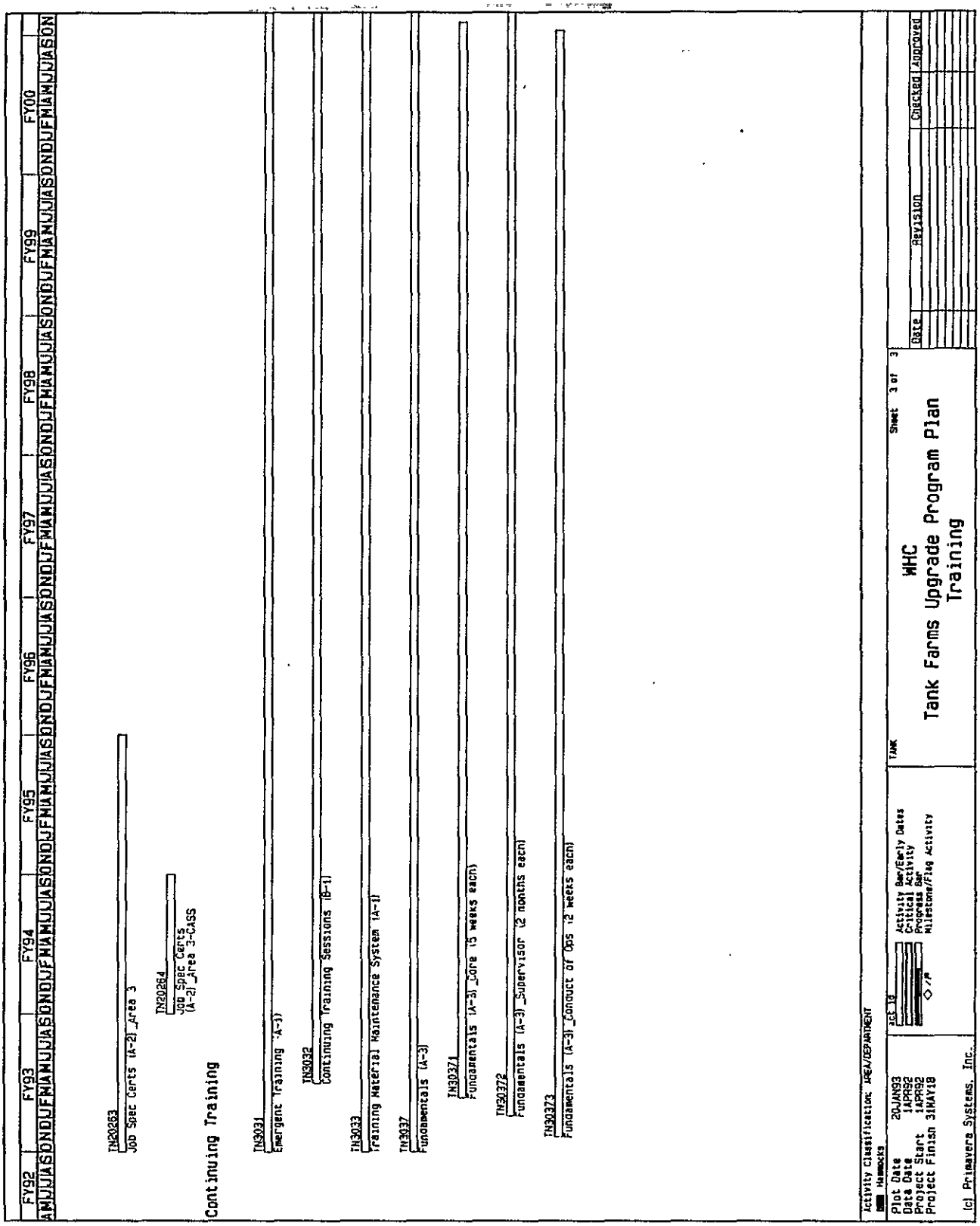


Figure 6.5-1. Training Schedule.



6.6 TURNOVER PROGRAM

6.6.1 GOAL

The Turnover Program goal is to ensure that all new equipment being turned over to operations has all applicable drawings as-built, an issued design system description, a spare parts list, all applicable procedures in place, trained personnel to operate and maintain the equipment, and that equipment has been appropriately tested. In short, the Turnover Program will ensure that the new equipment installation satisfies all program requirements whether or not the programs are considered to be "in place." The program is intended to eliminate the problem of putting noncompliant equipment in service.

6.6.2 SUMMARY ACTION PLAN

Turnover is the process whereby equipment goes from the design stage to the fully operational condition. It starts before construction, or at least at the time construction starts, and is not complete until all things required to support the operation of the equipment are in place and the equipment has been tested and shown to be fully operable. When turnover is complete, all drawings are completed in the as-built condition, a system description has been issued, procedures to operate and maintain the equipment are in place, spare parts are available, and operations and maintenance personnel have been trained on the subject equipment and procedures.

This program will identify an organization for monitoring and controlling turnover; this organization will issue a procedure that defines requirements and responsibilities and develop a tracking system to follow the Turnover process. The process will include requirements to issue a system description when construction begins so that training and procedures on the system can be developed.

A schedule will be developed identifying each item, when it is required, and the responsible individual. Walkdowns will be required, and deficiencies will be input to the tracking system. Turnover requirements will include identifying required as-built drawings. An experienced individual will lead walkdowns. The tracking system will continue to track items required after turnover until they are completed.

6.6.3 JUSTIFICATION

Control of the turnover process is required to ensure completion of construction and verify that equipment is fully operable. Early implementation of this process control is required as a first step in implementing Conduct of Engineering, Configuration Management, and other management programs.

6.6.4 MILESTONES

- Name an organization to track and control turnover of equipment--October 1993.
- Issue procedure governing turnover process--December 1993.
- Implement computerized tracking list to track scheduled turnover items--February 1994.

6.6.5 TIE-INS

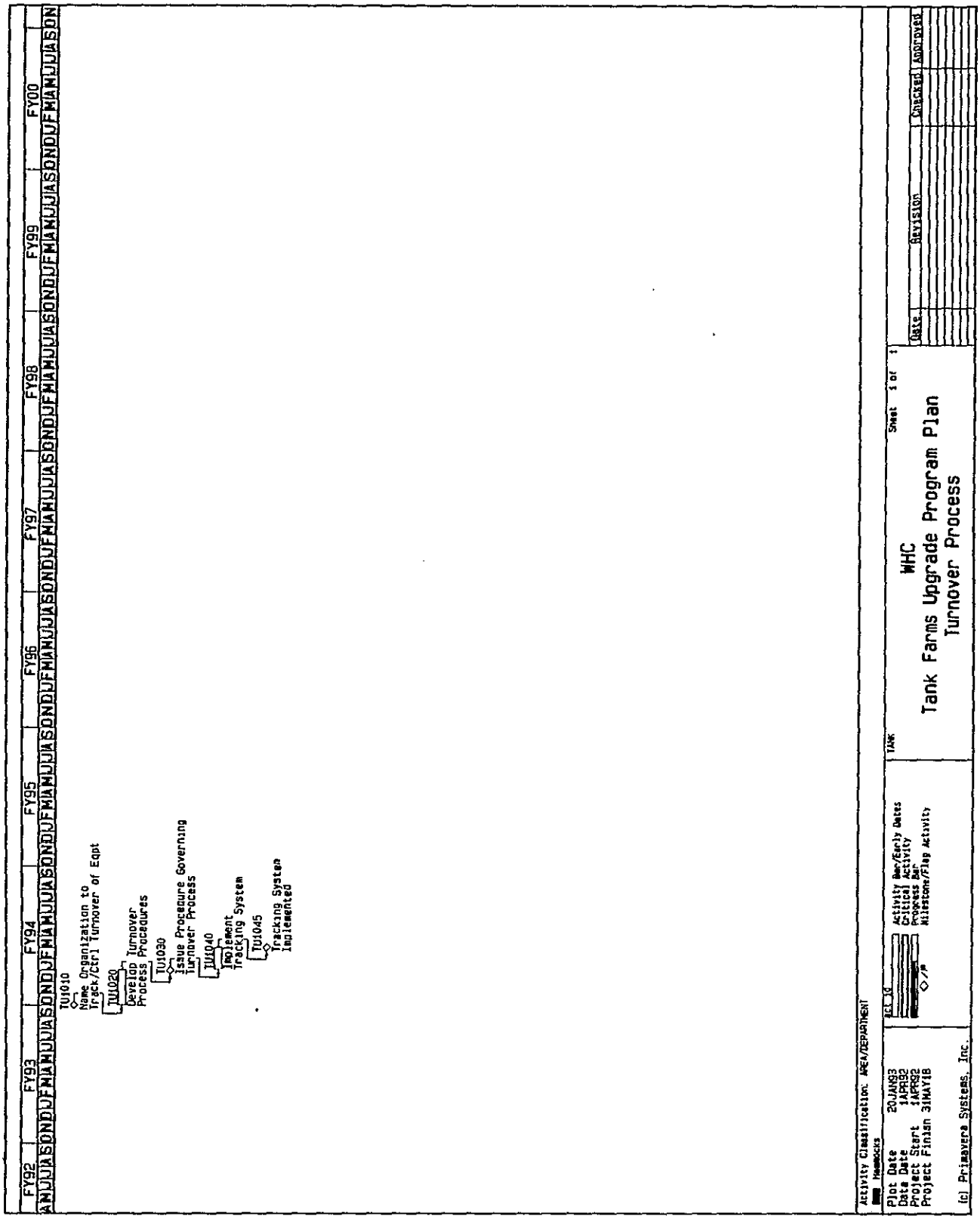
The Turnover Upgrades Program will support other programs on new equipment as mentioned below, but other programs do not constrain it. Therefore, there are no tie-ins.

- Configuration Management will ensure that completed as-built drawings and documents are available.
- Conduct of Operations will ensure that required procedures are available and complete.
- Maintenance Management Program will ensure that maintenance procedures are identified and issued before they are needed in the field.
- Training will ensure that a system description is available for training on the equipment and that training requirements are identified.

6.6.6 CONTINGENCY

- Funding and staffing to implement turnover process improvements must be identified for fiscal year 1993.

Figure 6.6-1. Turnover Program Schedule.



6.7 SAFETY DOCUMENTATION

6.7.1 GOAL

The safety documentation upgrade goal is to establish interim safety bases (ISB) for operations until upgraded safety analysis reports (SAR) are available; the ISBs will include upgraded operating safety requirements (OSRs), safety equipment lists, and other safe Conduct of Operations requirements for the interim period pending implementation of final safety analysis report (FSAR) requirements.

The safety documentation upgrade action plan will consolidate and upgrade existing SARs for Tank Farm facilities to meet the U.S. Department of Energy (DOE) Orders 5480.22[1] and 5480.23[2] requirements for safe operations. In addition, the upgraded SARs will be updated periodically to reflect future Tank Farm changes.

6.7.2 SUMMARY ACTION PLAN

The action plan will identify plans for upgrading safety equipment and documentation for double-shell tanks, single-shell tanks, and the 242-A Evaporator. ISB documentation for these facilities will be prepared, including upgraded OSRs. The ISB will provide the bases for continued operations and/or restrictions on operations until the upgraded FSARs are available. In addition, safety assessments will be prepared for intrusion work at the Watchlist tanks.

The current Tank Farm facility SARs will be consolidated into four categories: aging-waste tanks, double-shell tanks, single-shell tanks, and Tank Farm evaporators. The quality of the SARs will be upgraded to meet current DOE content and format requirements. In addition, a technical safety requirement (TSR) document will be issued to define the safe conduct of operations envelope. This work is being performed under work breakdown structure element 1N1, but is included here because it is pivotal to resulting safety upgrades.

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[1]DOE, 1992, *Technical Safety Requirements*, DOE Order 5450.22, U.S. Department of Energy, Washington, D.C.

[2]DOE, 1992, *Nuclear Safety Analysis Reports*, DOE Order 5480.23, U.S. Department of Energy, Washington, D.C.

6.7.3 JUSTIFICATION

Tank Farm facilities must continue to be operated to contain liquid and solidified wastes safely. However, existing SARs do not adequately define the OSRs and other safe conduct of operations requirements as required in DOE Orders 5480.22 and 5480.23.[3] The safety bases for operations must be upgraded in the interim until FSARs can be prepared. In addition, mitigation and remedial actions may be required on the Watchlist tanks to ensure safe containment of the wastes. These actions must be analyzed for tank system intrusion safety.

The multiple SARs need to be consolidated to provide single-source safety documentation for similar facilities and to comply with DOE orders.

6.7.4 MILESTONES

Double-Shell Tanks

- Provide safety equipment list - fiscal year (FY) 1993
- Complete preliminary hazards evaluation - FY 1993
- Provide ISB documentation for DOE approval - June 1, 1993
- Complete implementation of ISB requirements - TBD (for planning purposes assumed to be completed within 2 years)
- Complete technical bases - FY 1994
- Complete accident analysis task - FY 1994
- Complete first draft of SAR - FY 1994
- Complete Westinghouse Hanford Company internal reviews and resolve comments - FY 1995
- Complete second draft of SAR - FY 1995
- DOE review and comment resolution completed - FY 1996
- Issue final SAR - FY 1996
- Fully implement SAR requirements - FY 1998

[3]See Notes 1 and 2.

Single-Shell Tanks

- Complete preliminary hazards evaluation - FY 1993
- Provide updated safety equipment list - FY 1993
- Complete preliminary SAR for tank C-106 retrieval - FY 1993
- Provide ISB documentation for DOE approval - June 1, 1993
- Complete implementation of ISB requirements - TBD (for planning purposes, assumed to be completed within 2 years)
- Evaluate safety of mitigation and remedial actions - FY 1994
- Complete technical safety bases document - FY 1993
- Complete accident analysis task - FY 1994
- Complete draft SAR - FY 1996
- Issue final SAR - FY 1997

242-A Evaporator

- Provide updated safety equipment list - complete
- Provide ISB documentation for DOE approval - June 1, 1993
- Upgrade recently revised FSAR to meet requirements of DOE Orders 5480.22 and 5480.23[4] - FY 1995

6.7.5 TIE-INS

Double-shell Tanks

- Essential drawings (field verified) are required to support development of final SARs. Tie-ins exist with configuration management.
- Availability of design bases are required for issuance of final SARs. Tie-ins exist with Conduct of Engineering and Configuration Management.

[4]See Notes 1 and 2.

6.7.6 CONTINGENCIES

- The development of final safety documentation could be affected by the final retrieval and disposal options selected and by the schedule for final disposal.

- Resolution of known safety issues or discovery of new concerns could potentially affect the completion of this action plan.

- Review and approval schedules for safety documentation and the potential for new issues being identified during the review process is a significant uncertainty associated with this action plan. The upgrades planning in this document assumes timely review, approval, and implementation of interim OSRs and the ISB. The approach will be to begin implementation of the ISB and OSRs in parallel with the DOE review and approval process. Most issues identified in the review process (unless an urgent safety problem is identified) will be resolved by the FSAR preparation.

6.7.7 SCHEDULE

Refer to Figure 6.7-1.

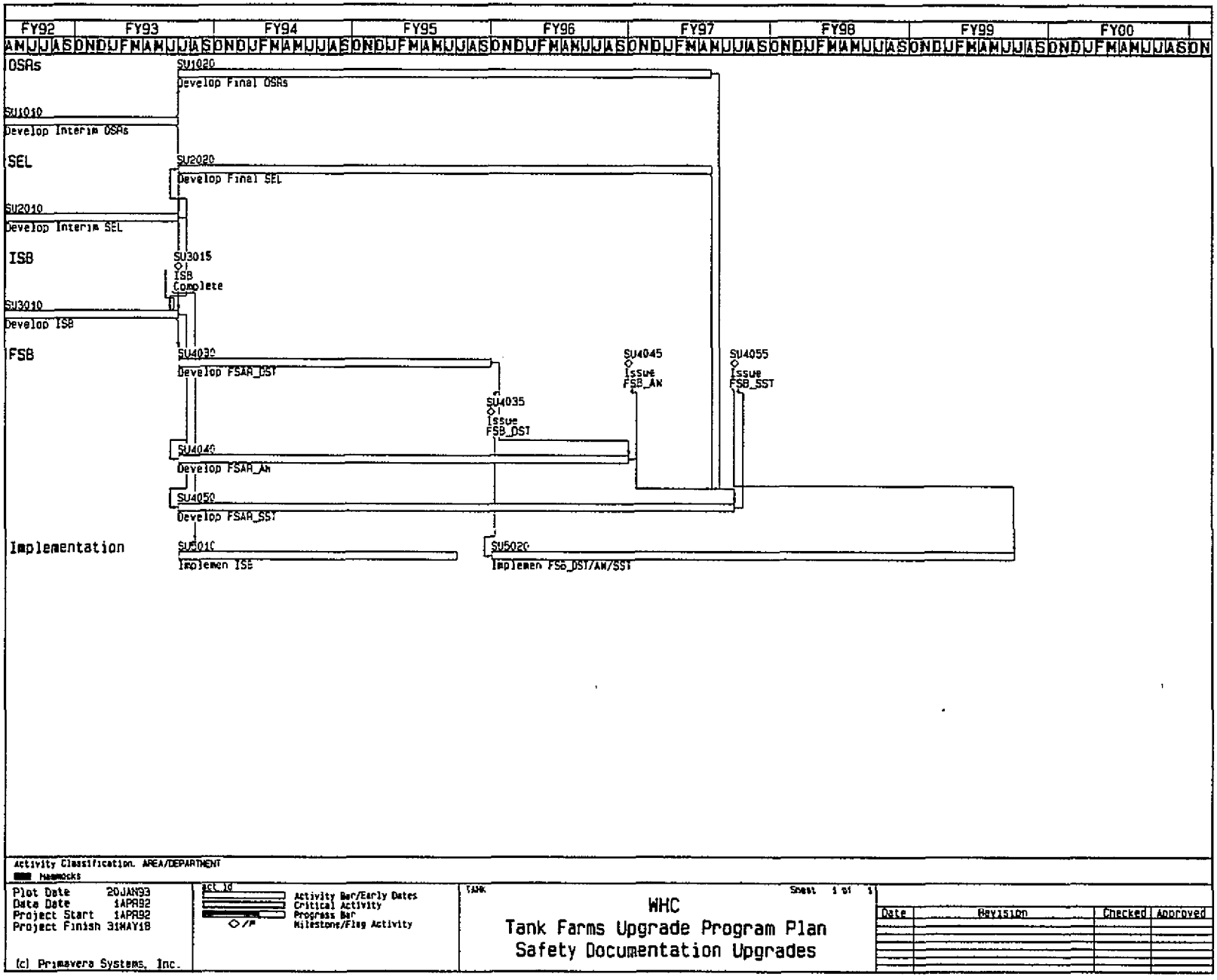

Figure 6.7-1. Safety Documentation Schedule.

6.8 CONTAINMENT

6.8.1 GOAL

The goal of upgrading the containment systems is to ensure wastes are contained safely until and during retrieval. When a comprehensive assessment is complete, appropriate hardware upgrade projects will be implemented. Containment systems include the following: single-shell tanks (SSTs), double-shell tanks (DSTs), transfer lines, diversion boxes, catch tanks, and seal pots.

6.8.2 SUMMARY ACTION PLAN

The first step in the action plan for upgrading containment systems is to provide a structural integrity assessment of all Tank Farm dangerous waste storage tanks and ancillary structures. The purpose of this assessment is to address those structures requiring restoration or upgrades.

Single-Shell Tanks. Develop a plan to assess the SSTs for current and future retrieval plans. Implement an inspection plan in accordance with the assessment evaluation to determine the structural integrity of the tanks for containment.

All remaining items discussed in this action plan are associated with double-shell tank farms.

Double-Shell Tanks--A structural integrity assessment program is being implemented for DSTs. This program will provide an in-service inspection program to measure tank wall thickness and assess possible tank corrosion and degradation effects. This program will allow accurate tank life projections.

An effort is in progress to obtain primary tank wall thickness measurements and wall integrity assessments on all 28 DSTs. This nondestructive testing activity requires a private contractor to develop and test a remotely operable nondestructive system for measuring primary tank wall thickness and pitting corrosion and to detect as-built or service-generated flaws or cracks. These measurements will be used to assess tank integrity.

Transfer Lines--See Section 6.16, Waste Transfer, for a description of transfer lines upgrades.

Diversion Boxes--Currently, three alternatives are being considered for upgrading the diversion boxes. The action plan involves selection and implementation of one of the alternatives.

Catch Tanks--Catch tank upgrades include cleaning out and equipping the 241-AX-152 diverter station catch tank with a new pump. Installation of new double-shelled catch tanks as identified in the systems analysis of the DST farms will be required for the other locations.[1]

Seal Pots--Table 6.8-1 identifies the 10 noncompliant seal pot systems requiring complete replacement. The four systems that are only partially noncompliant are to be modified for compliance.[2]

Cathodic Protection--Establish a design coordinator for cathodic protection systems Sitewide and evaluate the need for upgrades and implement as necessary.

6.8.3 JUSTIFICATION

Single-Shell Tanks Structural Integrity--The SSTs appear to meet the material, stress and environmental conditions that produce stress corrosion cracking (SCC). Based on these conditions, it can be concluded that SCC should be considered a primary, but not the only, potential failure mechanism of the SSTs. SCC can allow waste to escape from the SSTs to the environment. Also, pitting along the waste/vapor interface is a known SST failure mechanism. Many tanks are noted leakers. A comprehensive structural assessment is required to determine whether upgrades of SSTs or other leak mitigation strategies are required pending removal of tank wastes for disposal.

Double-Shell Tanks--A DST farm includes transfer lines that connect the tanks through diversion boxes. The transfer lines are encased in concrete raceways. The encasements are sloped towards a diversion box, valve pit, or catch tank to drain any liquid out of the encasements. A catch tank acts as a secondary containment in that it receives spilled or leaked waste from a primary containment system. Like the catch tanks, the diversion box acts as a secondary containment structure. Within the diversion box, the transfer of waste is accomplished by moveable jumper pipes, jumper pipes with valves, or a receiver tank with a moveable spout. The seal pots are small, buried tanks that function as drain traps collecting condensed vapors. Seal pots are primary containment. The seal pots provide a barrier between two dissimilar vapor environments while allowing the condensation to drain.

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[1]LaSalle, F. R., 1991, *Engineering Study-Catch Tanks Environmental Upgrades for Tank Farms*, WHC-SD-WM-ES-156, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

[2]Goldberg, P. R., 1991, *Engineering Study-Seal Pots and Associated Drain Piping Environmental Upgrades for Tank Farms*, WHC-SD-WM-ES-157, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Table 6.8-1. Seal Pot/Drain Line Disposition.

Seal Pot	Depth of Burial Bottom of Seal Pot	Height of Seal Pot	Length of Pipe	Notes
COMPLETE REPLACEMENT				
702-A	12 ft	2 ft 1 in.	326 ft of 2 in. SST	Project W-030
4,000 ft^3/m	5 ft	N/A	20 ft (rest above grade)	Project W-030
241-AN Primary	5 ft	N/A	90 ft of 3 in. M24	
241-AN Annulus	5 ft	N/A	90 ft	
241-AN Demister	5 ft	2 ft 6 in.	90 ft	
241-AP Annulus	6 ft	24 in.	190 ft of M24	
241-AW Primary	7 ft	N/A	400 ft of 1-1/2 in.	
241-AW Annulus	7 ft	N/A	70 ft of 1-1/2 in.	
241-AW Demister	7 ft	2 ft 6 in.	25 ft of 3 in.	
244-AR	30 ft	4 ft 2 in.	40 ft buried*	
22 ABOVEGRADE SEAL POTS AND PIPING (may need upgrading only)				
241-SY Primary	Above grade	12 in.	95 ft, all above grade	
241-SY Annulus	Above grade	12 in.	95 ft, all above grade	
241-SY Exhauster	Above grade	12 in.	95 ft, all above grade	
702-A Steam	Above grade	4 ft 3 in.	20 ft, above grade	Drains to a floor drain

*Most of the piping runs inside vault; only about 40 ft is buried.

An in-service inspection program is currently being implemented for the DSTs. Tank wall integrity is influenced mainly by stress level and the type and rate of degradation of the wall. The two phenomena are interrelated; a decrease in wall thickness will increase hydraulic-induced and dead-load stresses. Degradation is that process (or processes) that produce either a decrease in wall thickness, a growth of flaws, a detrimental change in the mechanical properties of the steel wall, or all three. Tank wall mechanical properties are most likely unchanged[3], leaving decrease in wall thickness and growth of flaws as the primary degradation processes of concern.

Transfer Lines--The current waste transfer lines for SST are noncompliant with current regulations. Active DST transfer lines with noncompliant encasements are listed in Table 6.8-2. These lines are a part of the Tank Farm Transfer Inter-Facility Waste Storage System, which will need to remain active to support current and future operations of the Site (see Section 6.16, Waste Transfer).

Diversion Boxes--Three alternative solutions were considered to upgrade the existing boxes to bring them into compliance with the *Washington Administrative Code* (WAC) 173-303 requirements for secondary containment of dangerous waste for tank system ancillary equipment:[4,5]

Alternative 1 involves installing a valve and leak detector in the drain inside the existing boxes. A "pig" apparatus would be included to allow removal of this drain plug from above the box hatch covers. This design would allow early detection of any release from the primary containment and also provide timely removal of that release.

Alternative 2 consists of installing a valve and leak detector in the existing drain line outside the diversion box. This design would involve replacing a section of underground drain pipe and installing a permanent access caisson.

Alternative 3 would require installing an existing drain plug design into all the boxes. This design would not meet WAC requirements because a depth up to 3.8 cm (1.5 in.) of accumulated liquid [up to 757 L (200 gal)] could be on the floor in the box in the proximity of the drain opening for more than 24 hours.

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[3]Karwoski, W. J., 1992, *Structural Integrity Evaluation of 241-AW Tank Farm Dangerous Waste Storage Tank Facilities*, WHC-SD-WM-ER-126, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

[4]WAC 173-303, 1990, "Dangerous Waste Regulations", *Washington Administrative Code*, as amended.

[5]Sargent, F. D., 1991, *Engineering Study-Diversion Boxes Environmental Upgrade for Tank Farms*, WHC-SD-WM-ES-159, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Table 6.8-2. Noncompliant Active Lines Requiring Upgrading. (4 sheets)

Waste Generator	Active Transfer	From	To	Length (ft)	Pipe Size (in.)	Pipe Material	Priority	Notes
T Plant	V-715	T Plant	TX-154	100	3.5 OD	11GA 18-8 SST	1	H-2 (819,71660)
	V-387	TX-154	TX-152	3,000	3.5 OD	11GA 18-8 SST	1	Currently used
	V-388	TX-154	TX-152	3,000	3.5 OD	11GA 18-8 SST	1	Spare line
Z Plant	V-402	244 TX	TX-152	1,000	3 OD	M25	1	Currently used
	V-406	242 TX	TX-152	1,000	3 OD	M25		
Shared Z Plant/T Plant	V-198	TX-152	U-152	3,500	3.5 OD	11GA 18-8 SST	1	T Plant
	V-404	TX-152	U-152	3,500	3.5 OD	11GA 18-8 SST	1	Z Plant
	V-421/V-453	U-152	U-151	50	3.5 OD	11GA 18-8 SST	1	T Plant
	V-422/V-452	U-152	U-151	50	3.5 OD	11GA 18-8 SST	1	Z Plant
	V-455	U-151	S-151	2,500	3.5 OD	11GA 18-8 SST	1	T Plant
	V-456	U-151	244-S	2,900	3.5 OD	SST, M25	1	Z Plant
	New line	T Plant	S-151	10,080	3.5 OD	11GA 18-8 SST	1	New Route
	New line	Z Plant	S-151	6,800	3.5 OD	11GA 18-8 SST		New Route
S Plant	3603/V-517	Redox	S-151	1,500	3.5 OD	11GA 18-8 SST	1	Project W-087
	1115	Redox	S-151	1,500			1	to replace
	106	222-S	Redox				1	S Plant Line
U Plant	V505/4701	UX-154	S-151	3,500	3.5 OD	12GA 347 SST	3	Evaporator feed
	V503/4700	S-151	UX-154	3,500	3.5 OD	12GA 347 SST	3	DSSF
	V-074	U Plant	UX-154	100			3	From 221-U

Table 6.8-2. Noncompliant Active Lines Requiring Upgrading. (4 sheets)

Waste Generator	Active Transfer	From	To	Length (ft)	Pipe Size (in.)	Pipe Material	Priority	Notes
PUREX	4003/4017/T037	PUREX	AX-152	2,000*	3 - 4	SST ASTM A-312 SST ASTM A-312	2	NHW, NCAW Backup system
	4511/4601	AX-152	102-AZ	200	3 - 4	SST ASTM A-312	2	NHW, NCAW Backup system
	4508	AX-152	101-AZ	200	3 - 4	M9	2	NHW, NCAW Backup system
	G026/T031/4002 8/4/4015	PUREX	244-AR	2,300	3	M9 M9	3	Inactive
	4506	AX-155	102-AY	150	3	M9	1	ref: H-2-90353
	4503	AX-155	101-AY	150	3	M9	1	
	4512/4600	AX-155	102-AZ	200	3 - 4	Black steel	1	
	4509/4507	AX-155	101-AZ	200	3 - 4	M5	1	part pipe-in-pipe
	4608	AX-152	101-AY	350	3	M5 M5	1	15 ft is concrete
	4607	101-AZ	AZ-152	15	3	M5	1	encased from
	D603	101-AZ	AZ-152	15	6		1	AZ-152
	S609	AZ-152	101-AZ	15	6	M5	1	
	S608	AZ-152	101-AZ	15	6	M5 M5	1	
	4606	102-AZ	AZ-152	130	3	M5	1	
	D602	102-AZ	AZ-152	150	6		1	
	S605	AZ-152	102-AZ	150	6		1	

Table 6.8-2. Noncompliant Active Lines Requiring Upgrading. (4 sheets)

Waste Generator	Active Transfer	From	To	Length (ft)	Pipe Size (in.)	Pipe Material	Priority	Notes
B Plant	834/8653/818**	B Plant	244-AR	8,100	3	M9	1	Project W-028
	833/8618/809**	244-AR	B Plant	8,100	3	M9	1	to replace
	New lines (2)	B Plant	244-AR	8,100	3	M9	1	
	4006/4018	244-AR	AX-152	500	4	M9	1	
	A1061/4504	AX-152	102-AY	150	4	M9	1	
	B1061/4505	AX-152	102-AY	150	3 - 4	SST ASTM A-312 M9	1	
	A1081/4501	AX-152	102-AY	150	4	SST ASTM A-312	1	
	B1081/4502	AX-152	102-AY	150	3 - 4	M9	1	
	V-718/817	244-AR	AR-151	175	3		1	Project W-110
272-AW	DR-374	272-AW	241-AP	40			2	Direct burled
242-A Ep	SN-247	AX-B-VP	101-AN	150	2	M25	2	Direct burled

Table 6.8-2. Noncompliant Active Lines Requiring Upgrading. (4 sheets)

Waste Generator	Active Transfer	From	To	Length (ft)	Pipe Size (in.)	Pipe Material	Priority	Notes
Cross-site Transfer	V503/4700	S-151	UX-154	4,500	3.5 OD	SST	1	Project W-052
	V503/4701	S-151	UX-154	4,500	3.5 OD	SST	1	to replace
	V-360	UX-154	EW-151	12,000	3.5 OD	11GA 18-8 SST	1	
	V-361	UX-154	EW-151	12,000	3.5 OD	11GA 18-8 SST	1	
	V-360	EW-151	ER-151	10,500	3.5	11GA 18-8 SST	1	Project W-053
	V-361	EW-151	ER-151	10,500	3.5	11GA 18-8 SST	1	to replace
	V-228	ER-151	ER-153	7,600	3	M9	1	
	V-244	ER-152	ER-151	7,100	3	M35	1	
	V-229	ER-151	ER-152	500	3	M9	1	
	232	ER-153	244-A	550	3	M25	1	
	234	ER-153	244-A	550	3	M25	1	
	V-244	B Plant	ER-152	420	3	M9	1	
	New lines (2)	SY-ASB	244-A	18,000	3	Carbon steel	1	

*New lines are less than 150 m (500 ft) offset from existing line.
**Back-up lines for emergency.

Alternative 1 is recommended because it is less costly than Alternative 2 and because Alternative 3 does not fully comply with WAC 173-303 requirements.[6]

Catch Tanks--The active catch tanks are listed in Table 6.8-3 along with the facilities they service. The catch tanks do not comply with secondary containment regulations for several reasons. In normal operation, the tanks are maintained with an approximate 76-cm (30-in.) heel of waste. The design of the catch tanks is such that they cannot be pumped absolutely dry because there is no slope or sump in the tanks, except for the 241-AX-152 diverter station, which has those features but does not have suitable pumping equipment.

The catch tank leak detection systems essentially measure leakage in the pump pit or liquid level in the tank. The pump pit leak detection system may not indicate that there is a leak in the primary containment system because the tanks have inlets that bypass the pump pit.

Table 6.8-3. Active Tank Farm Catch Tanks.[6]

200 West	Age	Service
241-TX-302C	1947	Flush water mixed with waste from 241-TX-154 diversion box
241-U-301B	1944	Processing and decontamination mixed waste solutions from 151 and 152 U
241-UX-302A	1947	Flush water and condensate mixed with waste from 241-UX-154
241-S-302A	1949	Flush water and condensate from 241-S-151 transfer box
200 East	**Age**	**Service**
241-ER-311	1954	Flush water and condensate from ER151 and 152--B Plant waste
241-A-302A	1954	Flush water and leaks from 241-A-151 PUREX waste
241-AX-152 Diverter Station	1962	Between AX and AY Tank Farms - B Plant waste

[6]See Note 1.

New double-shelled catch tanks should be installed because this alternative minimizes risk, provides a guaranteed 35-year life, and results in compliance with environmental regulations. Only the 241-AX-152 diverter station catch tank should be cleaned out and re-equipped with a new pump. Because the 241-AX-152 diverter station catch tank is used frequently, it should be given a high priority for upgrading.

Seal Pots--The DSTs are known to contain organic compounds that are considered dangerous wastes. These organic compounds have the potential to be transferred to the seal pots by way of condensation from ventilation air vapors; therefore, the seal pots are considered to contain dangerous waste.

The structural integrity of the existing belowgrade seal pots and drain lines should be assessed. The assessment process would consist of a combination of pressure testing to ensure the adequacy of the pressure boundaries and selective destructive testing of sections of buried pipe to measure the corrosion that may have occurred. The potential for meeting the required 35-year life of the systems can be measured by this assessment process.

Sixteen seal pots together with associated drain line piping systems have been evaluated.[7] To achieve compliance, the seal pots and drain lines must be provided with secondary containment, leak detection for both primary and secondary containment, and cathodic protection. Based on this study, none of the 16 seal pot systems are completely in compliance with those requirements because most seal pots do not contain leak detection devices and are not tested for leaks.

6.8.3.7 Cathodic Protection. Cathodic protection has been a successful corrosion prevention method on the underground radioactive waste lines at the Hanford Site for more than 40 years. It has been effective on both stainless and carbon steel buried lines.

Corrosion control of the waste lines at the Hanford Site has evolved in three stages: between 1944 and 1947, the underground waste line corrosion control practices were being developed and standardized; from 1947 to 1980, the original cathodic protected system was employed on the waste lines; and since 1980, the new cathodic protection system has been in place on the waste lines. The problems with the new cathodic protection system have been few, but some improvements have been made.

6.8.4 MILESTONES

- **Single-Shell Tanks**--Develop a plan to assess the SSTs for retrieval - January 1993 through January 1994.
- **Double-Shell Tanks**--Implement DST assessment program - October 1993 through April 1995.

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[7]See Note 2.

- **Diversion Boxes**--Perform upgrades and documentation - April 1996 through April 1998.

- **Catch Tanks**--Perform upgrades and documentation - October 1996 through December 1999.

- **Seal Pots**--Perform upgrades and documentation - April 1997 through June 1999.

- **Cathodic Protection**--Establish a design coordinator, evaluate need for and implement required upgrades - June 1996 through October 1999.

6.8.5 TIE-INS

- **Single-Shell Tanks**--The evaluation of the SSTs assesses the structural integrity of the tanks and their ability to contain waste without potential release to the environment. The assessment may affect the retrieval methods selected and/or scheduling.

  The installation of transfer lines and a storage tank for receiving waste is required before waste retrieval.

- **Double-Shell Tanks**--The structural integrity examination of the primary tank wall provides an assessment of the primary containment. The integrity evaluation may affect the future use of the tanks.

- **Ventilation Systems**--Upgrades to Tank Farm ventilation systems must be completed to support a complete containment system.

6.8.6 CONTINGENCIES

- **Single-Shell Tanks**--Neither the sequence for removal of waste from SSTs nor the length of time that waste must be retained in the tanks are well established. This uncertainty could affect planning for upgrades that relate to SST structural integrity.

- **Double-Shell Tanks**--The structural integrity assessment of the primary tank containment is contingent on satisfactory demonstration of the inspection process.

- **Diversion Boxes, Catch Tanks, and Seal Pots**--The scope of the Tank Farms mission and the requirements for certain transfer lines and other ancillary equipment depend on the waste generators' future plans and Hanford Site missions.

  Physical congestion near buildings or terminal facilities is likely, which will necessitate decommissioning the old transfer lines while constructing the new lines.

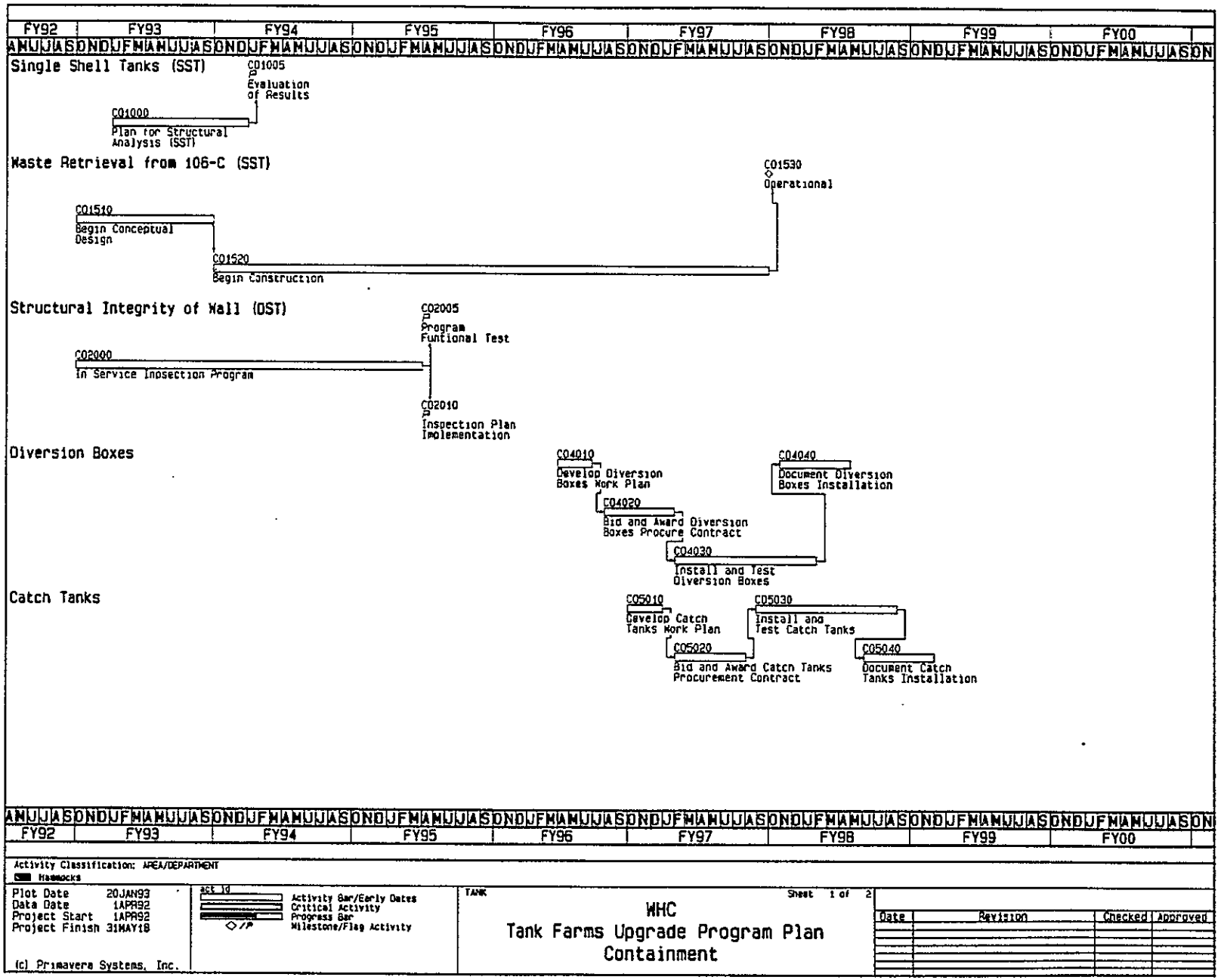
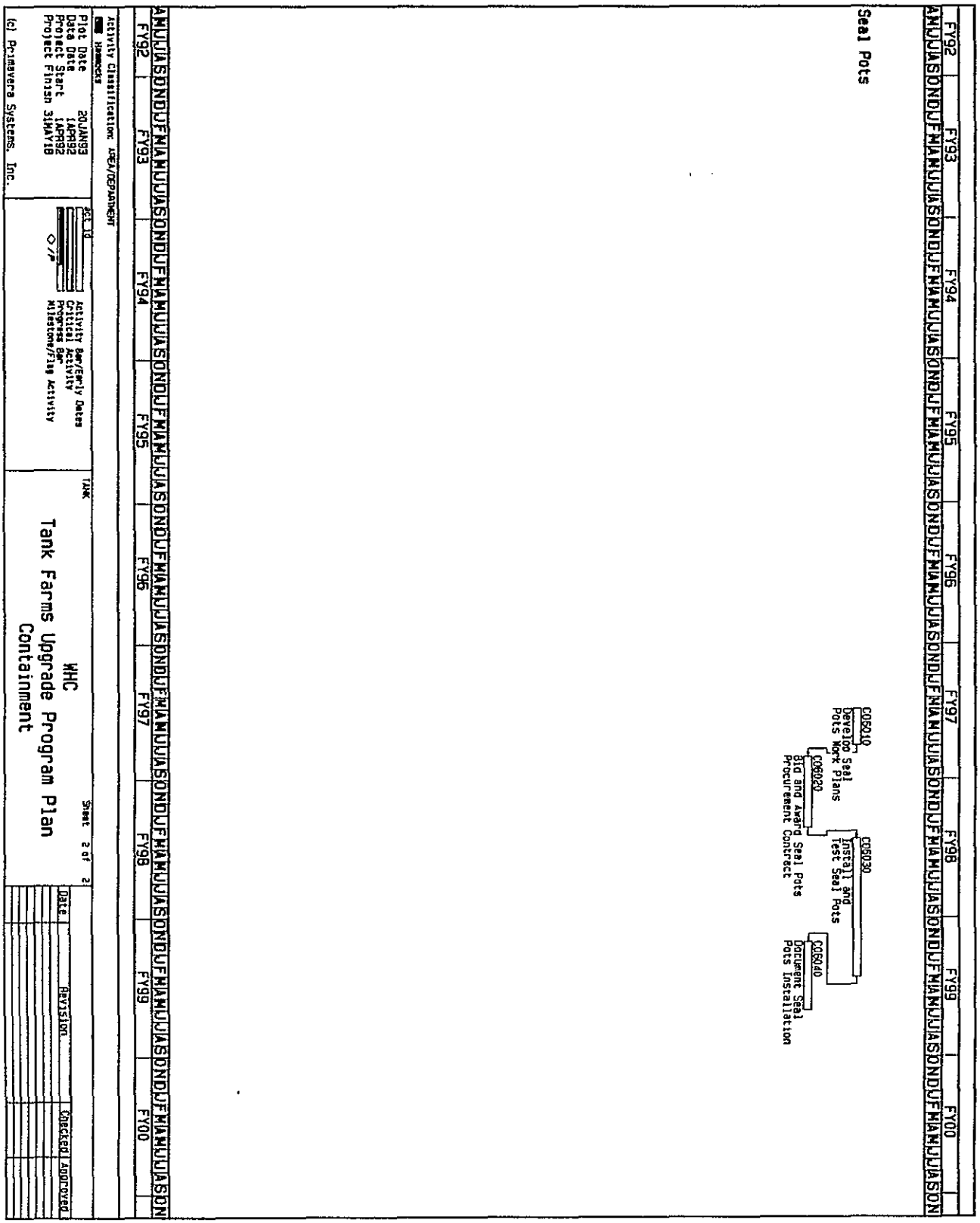


Figure 6.8-1. Containment Schedule

Figure 6.8-1. Containment Schedule



6.9 INSTRUMENTATION

6.9.1 GOAL

The Instrumentation Plan goal is to replace instrumentation and associated wiring within Tank Farm facilities as required to operate the farms in a safe and efficient manner. This upgrade activity is limited to those instruments that can no longer perform their intended function with normal maintenance.

6.9.2 SUMMARY ACTION PLAN

This action plan encompasses a broad spectrum of instrumentation types; therefore, the discussion is partitioned accordingly. The major categories of instrumentation are presented in subsections. Specific actions for each instrument category are provided. In addition to specific actions, selected instruments and sensors will be connected to the data acquisition system as discussed in Section 6.10. For a more detailed discussion of the instrumentation systems and the justification of the actions, refer to Section 6.9.3.

6.9.2.1 Tank Level. Tank level measuring requirements are unclear (see Section 6.9.3, Justification). The following actions are needed to establish requirements that address operational and safety needs.

- Establish level measurement requirements for active double-shell tanks as well as stabilized and nonstabilized single-shell tanks.
- Evaluate commercially available level instruments against operational and safety requirements to determine what instruments can best meet the level monitoring needs.
- Replace the existing Food Instrument Corporation (FIC) gauges with the appropriate technology in all double-shell tanks (DSTs).
- Replace the manual tape measuring devices (known as "flake boxes") on all DSTs.
- Upgrade the single-shell tank (SST) level instrumentation as appropriate, after establishing monitoring requirements.

6.9.2.2 Tank Temperature. The non-Watchlist DSTs in AN, AP, AW, and SY Tank Farms have adequate numbers of functional temperature sensors for both in-tank (waste) and structural temperature measurements. Measurements can be obtained manually at selector switches located in the tank farm instrument buildings. The aging-waste tanks (AY/AZ Tank Farms) do not have selector switches and also have a high number of failed sensors. The following actions are recommended for the DSTs:

- Install selector switches to allow manual reading of temperature sensors for aging waste tanks (AY/AZ).

- Repair or replace failed sensors on aging-waste tanks where possible.

The 10 non-Watchlist high-heat tanks (greater than 40,000 Btu/hr) and one Watchlist high-heat tank (C-106) have some temperature monitoring capability. The adequacy of these sensors relative to monitoring requirements is not known. The following actions are recommended for these tanks.

- Evaluate the sensors in these tanks and determine whether additional upgrades are needed.

- Upgrade as required.

All 24 ferrocyanide Watchlist tanks do not have adequate temperature instrumentation. Work is currently underway to upgrade these sensors and to connect them to the Tank Monitor and Control System (TMACS). This work should be continued. The flammable gas and organic Watchlist tanks need to be evaluated to determine whether temperature trees are adequate. If not, new temperature trees should be installed.

The remaining SSTs have no temperature-measuring requirements. These tanks need to be evaluated to determine what type of temperature monitoring is required. If monitoring is required, many of these tanks need new temperature trees.

6.9.2.3 Ventilation Exhaust Stack Monitoring. As discussed in the Section 6.9.3, Justification, as many as ten of the tank farm facility exhaust monitoring systems will likely require upgrading to meet requirements and to reduce the maintenance and calibration needed. The following exhaust monitoring systems are to be upgraded.

296-A-17	296-P-23	241-AP
296-A-21	296-S-15	105/106C
296-A-22	AY/AZ 702-A	105-A
296-A-27	242-A-BV	241-SY
296-A-29	242-A-VV	241-SX
296-A-40	241-AW	
207-P-16	241-AN	

The following actions are to be taken in the course of the upgrade.

- Perform a conceptual design using the best available technology.
- Obtain a ruling on the need for an environmental assessment or an environmental impact statement in accordance with the *National Environmental Policy Act of 1969*.[1] It is expected that no environmental assessment or environmental impact statement will be required because the upgrade work should qualify for categorical exclusion.
- Present the conceptual design to the U.S. Environmental Protection Agency for concept approval.
- Perform a detailed design for a new generic stack-monitoring system.
- Perform installation designs and upgrade each of the above monitoring systems discussed here.

6.9.2.4 Double Shell Tank Leak Detection. Primary tank leak detection consists of conductivity probes (flake boxes) in the annulus and continuous air monitors (CAMs) for radiation detection of the annulus exhaust air. The following leak detection actions are recommended.

- Replace the old conductivity probes used for annulus leak detection with the current new design.
- Redesign and replace the cabinet housing the annulus CAMs in all farms except the AP Tank Farm.
- Redesign and upgrade the CAM sampling system for the double-contained receiver tanks (DCRTs).

Secondary tank leak detection consists of leak detection pits that collect any drainage using concrete channels beneath the secondary containment. The water level and radiation level are monitored in the pits. The leak detection pits have adequate instrumentation for level detection; however, the radiation detection systems need to be redesigned and replaced.

6.9.2.5 Waste Transfer Leak Detection. Waste transfer systems such as cleanout boxes (COB), diversion boxes, valve pits, pump pits, drain pits, and pipeline encasements have conductivity probes for leak detection. In addition, area radiation monitors are used for surface leak detection. On alarm occurrence, these leak detectors activate pump shutdown

[1]*National Environmental Policy Act of 1969*, 42 U.S.C., et seq.

circuits. These detectors are also monitored by the surveillance loop. The following actions are recommended.

- Eliminate the surveillance loop and connect all sensors to the TMACS for monitoring.
- Review the master pump shutdown system for possible improvements to include more selective pump interlocks.
- Review the design bases for the area radiation monitors and determine the monitors' effectiveness as leak detectors. Upgrade or eliminate the detectors as required.
- Review the documentation, wiring, and remote alarms associated with all leak detection systems.
- Upgrade leak detection systems (determined by review).

6.9.2.6 Vapor Space Gas Monitoring. A standard hydrogen monitoring system has been designed and installed on Tank SY-101 and is scheduled to be installed on Tank SY-103. The plan is to install the system on the remaining hydrogen tanks.

Sampling equipment and instrumentation will be installed on selected tanks in the 241-BX, 241-BY, 241-C, 241-T, 241-TX, and 241-TY Tank Farms to characterize the gas in the vapor space. In addition, the air around the Tank Farms will be monitored to detect the presence of escaped gases.[2]

6.9.2.7 SST Leak Detection. Currently, four new drywell vans are being procured as replacements because the ones now in service are deteriorating. In addition to the four replacements, two more vans should be purchased. Also, new drywell van data transfer stations should be installed at 272AW (200 East Area) and at 272WA (200 West Area).

Currently, liquid observation wells (LOWs) are operational in 57 SSTs. The remaining 90 tanks should have LOWs installed. This activity is ongoing.

[2]Osborne, J. W., 1992, *Program Plan for the Resolution of Tank Vapor Issues*, WHC-EP-0562, Westinghouse Hanford Company, Richland, Washington.

6.9.2.8 Other Instrumentation. The following actions should be taken with respect to other instruments.

- Upgrade the alarm annunciator panels in the SST tank farms.
- Review the status of the tank pressure and vacuum instrumentation systems and upgrade as required.
- Upgrade miscellaneous instrumentation.

6.9.3 JUSTIFICATION

Much of the instrumentation is obsolete or has degraded to a level that prohibits recovery during the performance of normal maintenance efforts. Replacement is necessary to restore the capability to operate the facilities and to meet safety requirements. A more detailed justification for each instrument category is presented below.

6.9.3.1 Tank Level. The present reel-type conductivity gauge is no longer manufactured. Increasing failure rates of the gauges make continued use impractical. In addition, it has a nonstandard data interface that is incompatible with modern data acquisition equipment. The gauge is designed to sense only conductive liquids, and tank waste stabilization has reduced moisture content in many SSTs to the point that the gauge's continued use is of marginal value.

Safety requirements for tank level monitoring in DSTs are established, and maximum and minimum waste level limits are specified for safe operation of the tanks. The required surveillance frequency for these measurements is daily. In addition to the safety requirements, Operations uses the change in waste level as a confirmation of material movement during waste transfers.

To provide backup and a second independent level measurement, a manual reel tape level device called a flake box is installed on many tanks. This device has recently been redesigned and can be used for both level detection and conductivity detection in the DST annulus space. Many units of the older design are failing and need to be replaced.

Requirements for level monitoring in SSTs are given in WHC-SD-WM-TI-357[3] and OSD-T-151-00013.[4] The documents assume that level measurements are a valid indication of both tank leakage and moisture intrusion. Criteria are established for both decrease and

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[3]WHC, 1991, *Waste Storage Tank Status and Leak Detection Criteria*, WHC-SD-WM-TI-357, Rev. 1-E, Westinghouse Hanford Company, Richland, Washington.

[4]WHC, 1992, *Operating Specifications for Single Shell Waste Storage Tanks*, OSD-T-T-151-00013, Rev. D-1, Westinghouse Hanford Company, Richland, Washington.

increase in tank level; however, some of the stabilized SSTs have no decrease criteria because surface level measurement is a questionable means of leak detection. Some of these tanks have FIC gauges that have been modified to detect liquid intrusion.

Currently, the requirements for level monitoring and intrusion detection in waste storage tanks are not clearly delineated, and the technical bases are not adequately provided for all requirements. In particular, the need to measure surface level and to detect liquid intrusion in SSTs should be addressed to determine what future level instrumentation will be required on these tanks.

6.9.3.2 Tank Temperature. Specific requirements exist for measuring tank temperature for DSTs, high-heat tanks, and ferrocyanide Watchlist tanks. Requirements for temperature measurement in the remaining SSTs do not exist. All DSTs have both in-tank (waste) temperature sensors and structural and tank bottom sensors. The DSTs in AN, AP, AW, and SY Tank Farms have requirements established for temperature measurement. The waste temperature is required to be maintained below a maximum level and the surveillance frequency is daily. No requirements are placed on the number of sensors needed to establish the temperature. In addition, administrative control requirements are in place for recording and trending of tank concrete temperatures to ensure that rates of temperature change, thermal gradients, and maximum concrete tank temperatures do not result in a catastrophic failure of any DST during its 50-year life expectancy.

The DST (except AY and AZ) temperature sensors (both waste and structural) are functional and all are accessed for measurement via selector switches in the associated tank farm instrument building. The aging-waste DSTs (AY and AZ) do not have selector switches for manual data collection, and a significant number of temperature sensors have failed. Selector switches are needed to provide manual backup capability and failed sensors should be replaced where possible.

In addition, selected numbers of the sensors in all DSTs are connected to the Computer Automated Surveillance System (CASS) via data loggers. In most cases, these data loggers are nonfunctional and require replacement. Automatic data acquisition is necessary to cost effectively meet the requirement for daily temperature measurements and for trending of tank concrete temperatures.

High-heat tanks are defined as those tanks generating greater than 40,000 BTU/hr (11 tanks). Requirements for temperature monitoring in these tanks are given in WHC-SD-WM-SAR-006.[5] The waste temperature in these tanks must not exceed 149 °C (300 °F) and the monitoring frequency is 38 days. The tanks are required to have thermocouple trees with the stipulation that if two or more sensors fail, operability shall be restored as soon as practical. This requirement does not take into consideration the waste level or whether the failed sensors are actually in the waste. Currently, all of these tanks

[5]Bergman, L. M., 1986, *Single-Shell Tank Isolation Safety Analysis Report*, WHC-SD-WM-SAR-006, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

have functional temperature sensors; however, it is unclear whether these requirements are being met. These sensors should also be connected to the TMACS because regular monitoring and trending of data are necessary to ensure that the temperatures are not increasing.

The Watchlist tanks are identified in accordance with Section 3.3.7 of Public Law 101-510, also known as the "Wyden Bill."[6] These tanks are categorized as having a potential for flammable gas generation, high-heat load, containing greater than 1,000 gm mole of ferrocyanide, or greater than 3 percent weight of organics. The Wyden Bill requires continuous temperature and pressure monitoring on each Watchlist tank as soon as practicable. All Watchlist tanks have some temperature-monitoring capability, and current policy is to monitor temperature once a week. Additional requirements have been placed on ferrocyanide Watchlist tanks, which results in the addition of new temperature trees to all ferrocyanide tanks with connection of new and existing sensors to a continuous monitoring system. These requirements result from the U.S. Department of Energy accepting recommendations as outlined in WHC-EP-0415.[7] Because of the requirements in the Wyden Bill and Recommendation 90-7, all Watchlist tanks should have automatic data acquisition to ensure that continuous monitoring is achieved.

Currently, SSTs that are not high-heat or Watchlist tanks have no temperature monitoring requirements. These tanks should be reviewed, and a determination should be made regarding any need for temperature monitoring.

6.9.3.3 Ventilation Exhaust Stack Monitoring. The tank farms and associated facilities have approximately 30 ventilation exhaust systems. Most of these exhaust systems are equipped with continuous air monitoring and record sampling. Any exhaust system with the potential for offsite exposure of 0.1 mrem/yr must comply with 40 CFR 61, Subpart H.[8] This regulation places requirements on the monitoring and sampling system employed on the exhauster. Currently, only two systems, 296-A-22 (242 A Vessel Vent System) and 296-A-40 (241-AP Primary Ventilation System), are required to meet 40 CFR 61. It is anticipated that as many as eight more ventilation systems may be required to comply with 40 CFR 61, which would include all tank primary ventilation exhaust systems.

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[6]"Safety Measures for Waste Tanks at Hanford Nuclear Reservation", Section 3137, *National Defense Authorization Act for Fiscal Year 1991*, Public Law 101-510, November 5, 1990.

[7]Cash, R. J., and G. T. Dukelow, 1992, *Implementation Plan for the Defense Nuclear Facilities Safety Board Recommendation 90-7*, WHC-EP-0415, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

[8]40 CFR 61, "National Emission Standards for Emissions of Radionuclides other than Radon for Department of Energy Facilities", Title 40, *Code of Federal Regulations*, Part 61, Sub-part H.

These eight additional exhaust ventilation monitoring systems do not meet the requirements of 40 CFR 61, particularly in the area of isokinetic sampling. In addition, these systems are difficult to calibrate, and some of their components are high maintenance items. Components needed to design a system that meets 40 CFR 61 and to eliminate existing maintenance and calibration problems are available commercially. Because of the condition of the existing monitoring systems and the anticipated imposition of additional requirements, all 10 systems should be upgraded.

6.9.3.4 DST Leak Detection. Operational safety requires that primary tank leak detection be performed using both conductivity probes located in the tank annulus and CAMs to detect radiation in the annulus exhaust air.[9] The CAM systems in AP Tank Farm were built from a newer design that allows access for maintenance and is superior to the old design. The remaining DSTs have the older CAM design that is difficult to access. These systems should be replaced with a new design similar to the ones in AP Farm. Currently, all the systems except the DCRTs perform the intended function. In these tanks the systems pull a sample directly from the annulus rather than from the annulus exhauster. The systems should be redesigned to take the sample from the annulus exhaust to ensure complete coverage of the annulus.

In addition to air monitoring, the annulus space uses flake boxes leak detectors because a flake box is a manually operated conductivity level detector. When used in the annulus, the probe is suspended at a predetermined height, and when electrical conductivity is sensed, an alarm is triggered. Each annulus space has three flake boxes located at intervals around the annulus. The old flake boxes are wearing out and need to be replaced. The box has been redesigned to eliminate some of the problems with the earlier units. A replacement program has been initiated, with AP Tank Farm being targeted as the first farm to be refitted.

Operational safety also requires secondary tank leak detection systems consisting of level measurement and radiation detection in the leak detection pits. Each tank has a pit that collects any drainage from the secondary containment if it leaks. The water levels in these pits are maintained within a specific range. The level is measured by measuring the hydrostatic head of the water. These systems do not need to be replaced. Radiation detectors are also used to detect the presence of radioactivity in the leak detection pits. These systems are old, difficult to maintain, and should be replaced.

6.9.3.5 Waste Transfer Leak Detection. All waste transfer systems such as COBs, diversion boxes, valve pits, pump pits, drain pits, and pipeline encasements are required to have leak detection. For the waste transfer systems named above, these detectors consist

[9]WAC, 1990, "Dangerous Waste Regulations", WAC-173-303, Section 640, *Washington Administrative Code*.

primarily of conductivity probes located at moisture collection points. In addition, area radiation monitors are used to detect surface spills. WHC-SD-EN-EV-006 provides a detailed description of these systems and their operation.[10]

On alarm, many of the conductivity leak detectors and area radiation monitors will activate pump shutdown circuits. Typically, the detector alarm circuits are composed of a serial loop within a tank farm containing numerous detectors on a single circuit. As a result, the pump shutdown circuits and alarm annunciation are nonspecific. These alarm circuits are also tied to a surveillance loop (Gamewell Loop) that uses archaic fire alarm transmitter technology. The transmitters are electromechanical and must be reset after activation. The interface of this system to CASS is not operational; however, a readout directly from the loop receiver is available in the 200 East and 200 West evaporator buildings. The entire pump shutdown circuit should be reviewed for possible improvements. The surveillance loop should be eliminated and each leak detection sensor should be monitored directly by TMAC.

In general, the conductivity detectors are sound and do not need replacing; however, the integrity of the wiring and associated alarm systems is questionable. Most of the wire is buried and some is beginning to fail. Also, many of the detectors have been abandoned and the documentation is not up to date. This problem is particularly true in the SST farms. These systems should be reviewed for possible alarm system and wiring upgrades.

The area radiation monitors are intended to detect surface spills. The design bases for these detectors are not well documented, and many questions have been raised about the detector's effectiveness. Design bases should be established for these detectors, and their effectiveness should be evaluated. This evaluation may result in increasing the number of detectors, relocating existing detectors, or abandoning the system.

6.9.3.6 Vapor Space Gas Monitoring. The Wyden Bill (Public Law 101-510)[11] resulted in the initial identification of 23 tanks with the potential for flammable gas generation. Later, another tank was added to the list. The Wyden Bill also requires that the tanks be monitored continuously "... to detect a release or excessive temperature or pressure ..." This subject is discussed in more detail in WHC-EP-0537.[12]

A standard hydrogen monitoring system has been designed and installed on Tank-SY-101. WHC-EP-0537 provides a schedule and priority for installation on the remaining hydrogen Watchlist tanks.

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[10]WHC, 1990, *Tank Spill and Overflow Prevention and Leak Detection*, WHC-SD-EN-EV-006, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

[11]See Note 8.

[12]Johnson, G. D., 1992d, *Fiscal Year 1992 Program Plan for Evaluation and Remediation of the Generation and Release of Flammable Gases in Hanford Site Waste Tanks*, WHC-EP-0537, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Entry into the 241-BX, 241-BY, 241-C, 241-T, 241-TX, and 241-TY Tank Farms requires the use of supplied breathing air. This protective measure was taken in response to several incidents of personnel exposure to noxious fumes in the vicinity of those tank farms, particularly those involving Tank 241-C-103. Vapor space characterization of selected tanks in those tank farms is the first step in resolving the tank vapor issue, and easing the restrictive entry requirements. In addition to the vapor space monitoring, the program plan for resolution of the issue includes monitoring of the air in the vicinity of the tank farms and instrumentation associated with the new exhausters that will be installed on the tanks.

6.9.3.7 SST Leak Detection. Leak detection technology for SSTs consists of tank supernate level measurement (where possible), interstitial liquid level detection, and external well logging for radioactive contaminants. Both in-tank and ex-tank well logging is accomplished using mobile vans (drywell vans) with interchangeable logging probes. Criteria and frequencies for logging are given in WHC-SD-WM-TI-357.[13] Currently, four drywell vans are operational; however, they are old and need replacing.

An activity is underway to procure four new vans with upgraded electronics and a mechanical boom. This activity is being funded with capital equipment money. Besides these four vans, two more are needed to maintain the schedule for logging of the wells. An impending reduction in the current logging speed to improve sensitivity will make this need even more acute.

The drywell vans use data transfer stations located in the tank farm areas to transfer well logging data to CASS. In response to Audit 89-0016, Findings 4 and 7, drywell van operations that require source checking all probes before and after well logging are being revised. The source checks must be performed before transmitting data to the CASS. Because the source check stations are located some distance from the data transfer stations (272AW and 272WA), implementation of this operational change will reduce efficiency if the existing transfer stations are used. As a result, new data transfer stations are required at 272AW (200 East Area) and at 272WA (200 West Area).

Interstitial liquid level measurement on interim stabilized SSTs is performed using LOWs installed in the tanks. These LOWs provide a conduit for inserting the logging probes for moisture measurement. Currently, 57 SSTs have operable LOWs installed, but all SSTs need them.

In addition to the van upgrade needs, other instrumentation and additional dry wells may be needed. The U.S. Government Accounting Office audit, *Nuclear Waste: Improvements Needed in Monitoring Contaminants in Hanford Soil,*[14] has raised questions

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[13]See Note 4.

[14]GAO, 1992, "Nuclear Waste: Improvements Needed in Monitoring Contaminants in Hanford Soils", U.S. General Accounting Office Report to the Chairman, Committee on Government Affairs, U.S. Senate.

about monitoring in the vadose zone. Currently, Westinghouse Hanford Company environmental groups are in the process of reviewing the monitoring needs for the vadose zone. The review may identify additional instrumentation and/or upgrades needed to meet the monitoring requirements.

6.9.3.8 Other Instrumentation. Alarms from instrumentation are annunciated locally (at each tank farm) using annunciator panels with engraved lighted windows. Typically, the annunciator windows are also connected to CASS. In the older tank farms, these annunciator panels need to be upgraded. Problems range from incorrect window labeling to poor wiring. Work is underway to perform this task, which is to be completed by the end of fiscal year 1994. The new annunciators have a modern computer interface, allowing easy connection to a data acquisition system.

Some question remains about the status of tank pressure and vacuum measuring instrumentation that is used on active ventilated tanks. These instruments require further review to determine their continued operability. For ventilated tanks that are high-heat generators, it may also be necessary to add instrumentation such as flow, humidity, and temperature to perform moisture balance. Again, additional investigations are required to make this determination.

Other miscellaneous categories of instrumentation may require upgrades to restore them to normal operating condition. In general, no categories individually have large numbers of instruments, such as the categories common to many tank farms. The following list are typical of these miscellaneous instruments:

- Process condensate radiation monitors
- Raw water pressure and flow
- Air circulator flow
- Seal pot level
- Process and instrument air pressure
- Building CAMs
- Exhauster flow and filter DP.

6.9.4 MILESTONES

- Discontinue the requirement for supplied breathing air at the 241-BX, 241-BY, 241-C, 241-T, 241-TX, and 241-TY Tank Farms. September 30, 1993.

- Upgrade gas monitoring in hydrogen Watchlist tanks, December 1995

- Upgrade tank level instrumentation, December 1996

- Upgrade DST leak detection, December 1996

- Upgrade temperature systems, December 1997
- Upgrade SST leak detection, December 1997
- Upgrade exhaust stack monitoring, December 1998
- Upgrade waste transfer leak detection, December 1998
- Upgrade miscellaneous instrumentation, December 1999.

6.9.5 TIE-INS

- Data Acquisition and Data Management--data acquisition and data management upgrades are affected by instrumentation because the acquired data will usually be connected to the data acquisition system.
- Electrical Distribution/Utilities--the availability of power and signal raceways necessary to upgrade the instrumentation must be coordinated with electrical upgrades.
- Instrument Air Systems--the amount of compressed air in each tank farm is greatly affected by replacing the FIC level gauges with nonair-using instruments, which greatly affects upgrades to compressors.
- Installation of vapor space monitoring systems in selected tank farms is required to allow operators to enter, which ties-in with Conduct of Operations.

6.9.6 CONTINGENCIES

- Results of current assessments of vadose zone monitoring needs may result in additional instrumentation needs (see 6.12.3.7).
- Safety assessments and environmental assessments may result in additional instrumentation needs.
- Revisions to safety analysis documents may identify additional monitoring needs or safety systems that require instrumentation.

6.9.7 SCHEDULE

Refer to Figure 6.9-1.

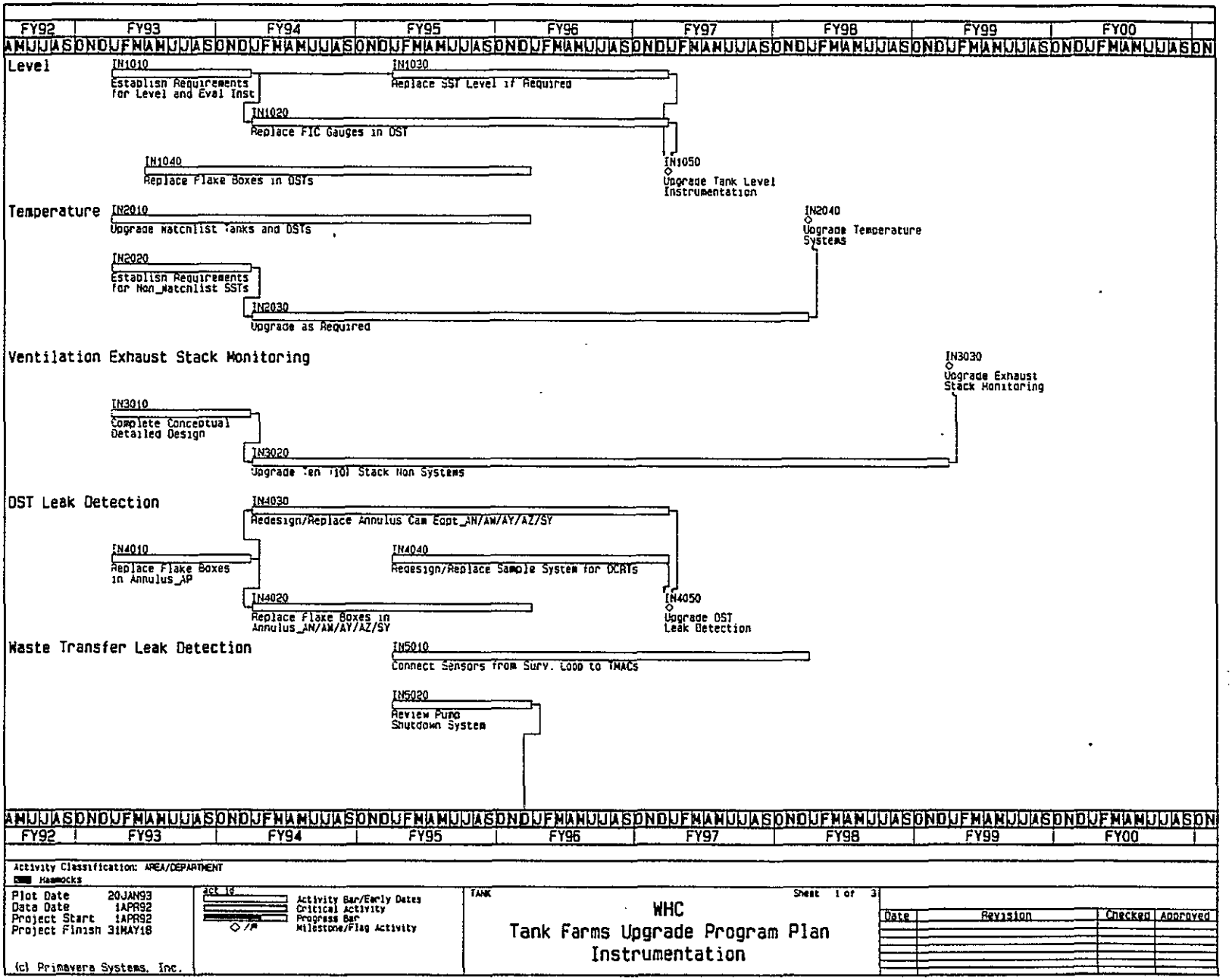


Figure 6.9-1. Instrumentation Schedule.

Figure 6.9-1. Instrumentation Schedule.

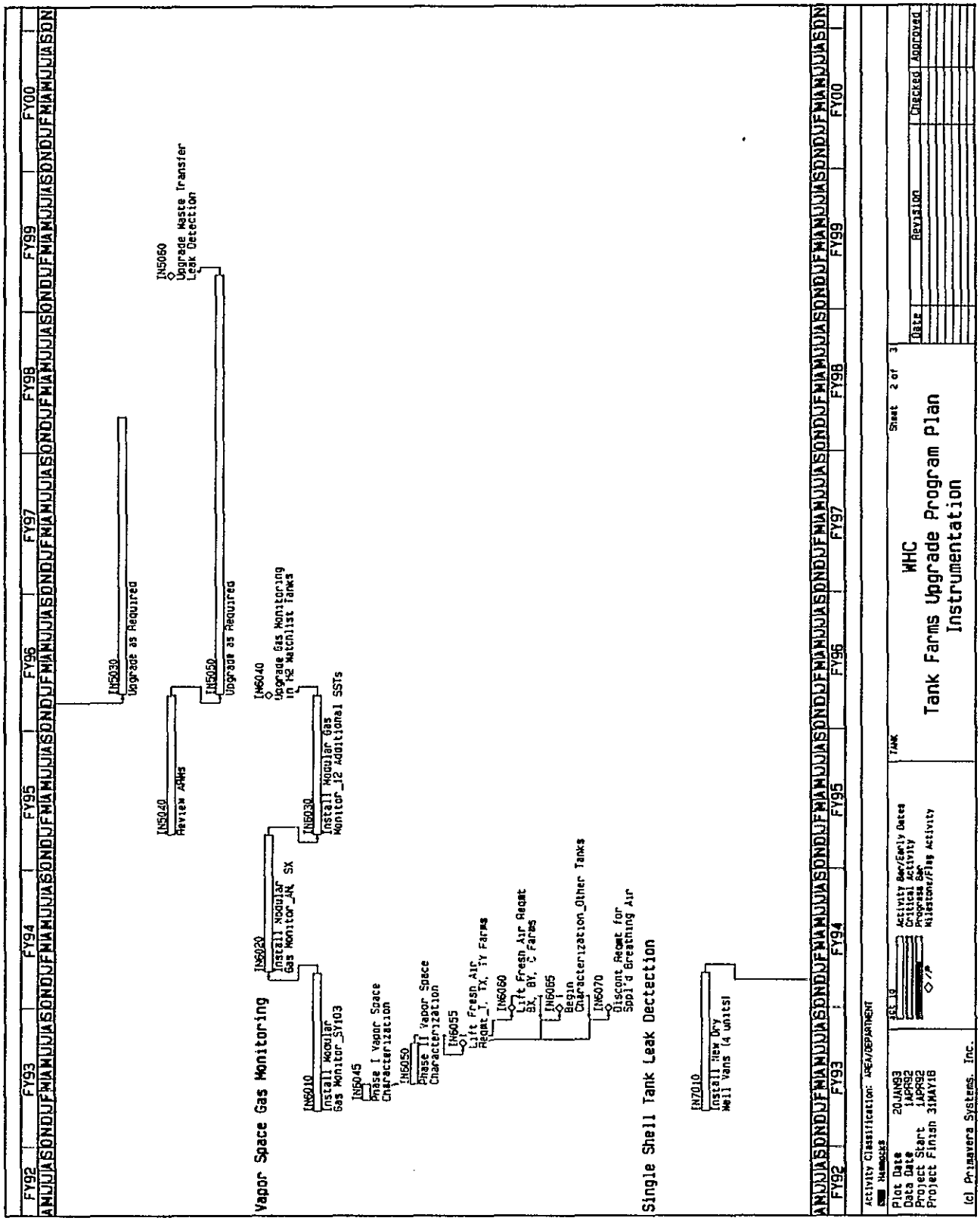
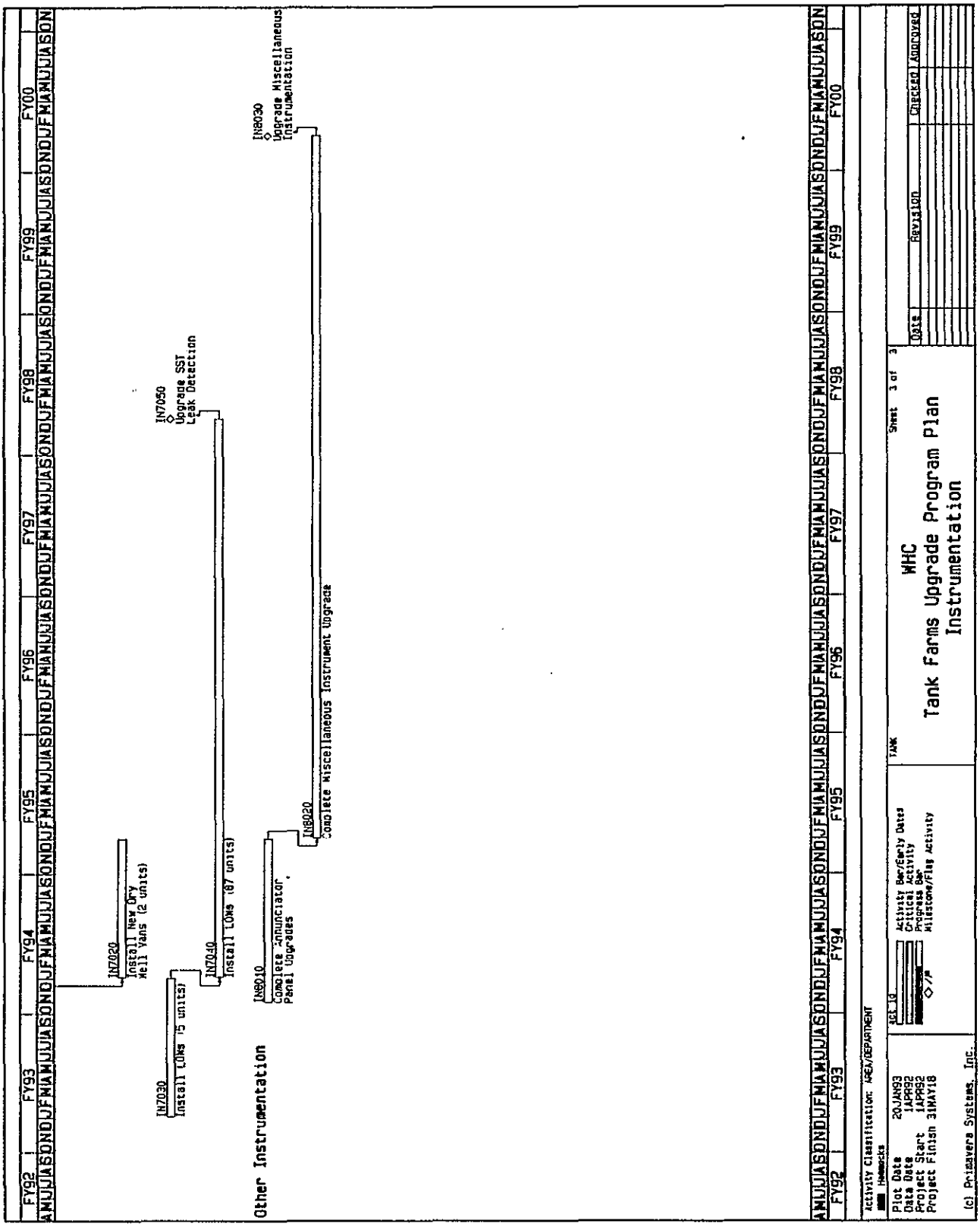


Figure 6.9-1. Instrumentation Schedule.



6.10 DATA ACQUISITION

6.10.1 GOAL

The Data Acquisition action plan goal is to provide a replacement for the existing Computer Automated Surveillance System (CASS) that can perform automatic data acquisition and control for all Tank Farm facilities. An additional goal is to improve manual data collection by partially automating the current manual system.

6.10.2 SUMMARY ACTION PLAN

Currently, the Tank Monitor and Control System (TMACS), a replacement system for CASS, is being implemented on a limited basis. The TMACS has been installed in some tank areas to monitor the temperature of ferrocyanide Watchlist tanks.

This action plan maps out the implementation of the TMACS at all Tank Farm facilities, which involves adding field hardware as required to connect to existing and new instrumentation. In parallel with this effort, the central monitoring facility software must be modified to accept data from the new instrumentation, which includes establishing alarm limits, status and alarm messages, facility graphics, and reports. In addition, software drivers will be written for new types of field remote terminal units (RTUs) and instrumentation. Part of this work may be completed on a case-by-case basis, as needed, with expense or capital-equipment-not-related-to-construction (CENRTC) funding. The remaining work will be accomplished as Project W-223, Tank Farms SCADA System, which is proposed for inclusion in the Tank Farms Major Systems Acquisition (W-314) (SCADA is Supervisory Control and Data Acquisition.)

Field modifications include installing new hardware and associated wiring for communication, power, and signal. Communication from remote facilities to the central facility can be achieved using telephone lines. Expansion can be accomplished in varying increments as dictated by the needs of the instrumentation or facility to be upgraded. In addition, the existing system can remain operational during the expansion process.

A hand-held data acquisition (HDAT) system has been implemented that uses bar code technology, hand-held computers, a database for storage and acquisition, associated software, and operational procedures to partially automate the manual tank temperature data collection for Tank Farms. Information collected is forwarded to the Surveillance Analysis Computer System (SACS).

To date, the system has been implemented in two tank farms for temperature data. The action plan is to extend implementation to all tank farms and to all types of data that are collected on a routine basis. Deployment of this system to other tank farms and data types requires identification of specific data to be collected as well as data location, range, units, and expected values. This information must then be programmed into the HDAT unit. In addition, the field collection points must be identified with bar code labels and appropriate procedural changes must be performed.

6.10.3 JUSTIFICATION

The TMACS has been installed in some tank areas for monitoring temperatures on Ferrocyanide Watchlist tanks. The TMACS consists of a centrally located monitoring computer that provides a modern operator interface. This computer is connected via telephone modem to RTUs located at or near the tanks being monitored. The system can accept all tank farm instrumentation via additional RTUs. In addition, the TMACS can accommodate RTUs from different manufacturers. This feature prevents total dependence on a specific technology or manufacturer. The TMACS is also connected to the SACS, a central repository for tank farm sensor data (see Section 6.11).

The TMACS provides an excellent operator interface for presenting tank farm status. The use of high-resolution graphics allows information to be presented geographically on a high level with a hierarchy of displays that move from the general to the specific. Alarms are displayed graphically (by facility or equipment) and summarized in chronological order using text. Real-time and historical trending are available to the operator for any parameter, on request. The displays are updated dynamically whenever equipment or measured parameter status changes. This collection of features continually provides the operator with a total picture of tank farm and facility status.

A data acquisition system is required to provide real-time alarm monitoring and status of Tank Farm facilities. In addition, a system is required to collect data for automatic transfer to a management information system for engineering analysis and archiving. Automatic collection is necessary to provide data in a timely manner. In addition, it helps achieve as low as reasonably achievable exposure goals by reducing entry into radiation areas for data collection.

CASS is a tank farm data acquisition system that was installed in 1978. It consists of six remote (at the tank farms) data monitoring computers that monitor thermocouples, alarms, and tank level. These remote computers communicate with a central surveillance computer (CSC) located in Building 2750E in the 200 East area. Although the CSC has been upgraded, except for addition of monitored points, the remote computers and field hardware have not been changed since the initial installation.

CASS was developed with custom field interface hardware and custom software at both the remote computers and the CSC. This design has resulted in a system that is now

inflexible to change and expansion. Most of the field hardware for monitoring thermocouples is inoperable and spare parts cannot be obtained.

At the CSC, the operator interface has no graphics capability and consists of an alphanumeric only terminal. The terminal provides messages to the operator regarding alarm status on occurrence. In general, status information can be obtained by entering commands from the keyboard. Hard copy is provided for all information. This operator interface is very poor by current standards. It requires the operator to rely on memory and/or piece together hard copy textual information to create the current status of a tank farm facility. New information must continually be processed mentally to maintain this picture, which is too much to ask of an operator for anything but a simple facility. The CASS system is no longer capable of meeting the data acquisition and control needs of the Tank Farm facilities and should be replaced.

Traditional facility operation manual data collection requires an operator to make rounds, read instruments, and write the information on data sheets. This manual process has always resulted in an inherent level of erroneous information. There are many opportunities intrinsic to the process for the errors to occur. The operator may read the wrong instrument, or be in the wrong location (e.g., wrong tank). The instrument may be misread, usually either order-of-magnitude or digit transposition. Transcribing the information onto the data sheet also could affect the data quality. The information can be entered into the wrong place on the form, which has the same effect as reading the wrong instrument or location.

Once the operators have completed their collection tasks, the data are subjected to another set of risks as they are keypunched into the archiving computer system. These errors are generally detected and sometimes are correctable by reviewing the data statistically, usually by computer. However, trying to detect and correct data, many times days later, is costly, time consuming, and may still result in an unacceptable level of data error. Putting the majority of quality control with the operator at the time of collection is always a preferred method. The HDAT system eliminates or reduces most of the above data collection problems.

Because automatic data acquisition will not be implemented for all tank farm data, many parameters will continue to be collected manually. Some information can only be obtained by field observation. In addition, failure of portions of the automatic data acquisition system will require manual collection of critical data until the system is restored to operation. It is therefore necessary to maintain a reliable manual data collection capability.

6.10.4 MILESTONES

- Complete TMACS for tank temperature monitoring, December 1996
- Complete Project W-223, Tank Farms SCADA System, which will include portions of the TMACS not previously installed, December 2000. (Project W-223 is proposed for inclusion in the Tank Farms Major Systems Acquisition, W-314.)
- Complete HDAT for all tank farms, December 1996

6.10.5 TIE-INS

- Instrumentation - the data acquisition upgrade must be coordinated with the instrumentation upgrades for construction timing and electronic interface compatibility.
- Data Management - data management upgrades are affected by data acquisition because the acquired data will be sent to the management information system.
- Central Tank Farm Facility - facility upgrades may provide a central tank farm building for operations personnel. This building may be the most desirable location for the data acquisition operator interface and must be coordinated with the data acquisition upgrade.
- Existing Tank Farm Instrumentation and Electrical Infrastructure - power and the required conduits and raceways may be cost effective as a general upgrade to the farms. These upgrades link instrumentation within the tank farms to communications equipment outside the farms.

6.10.6 CONTINGENCIES

No major technical obstacles prevent implementation of this action plan. To date, a model has been developed for expansion of the system.

6.10.7 SCHEDULE

Refer to Figure 6.10-1.

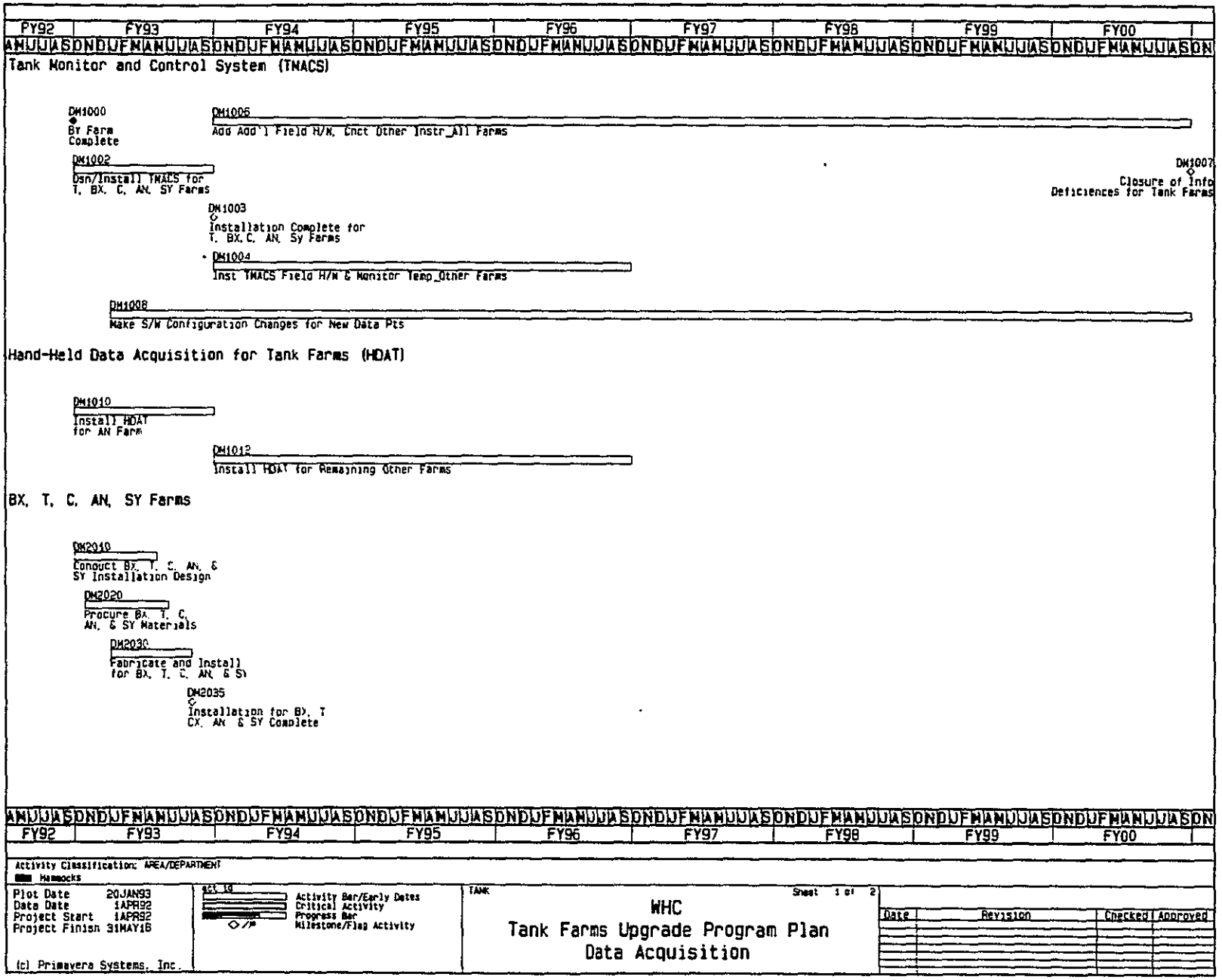
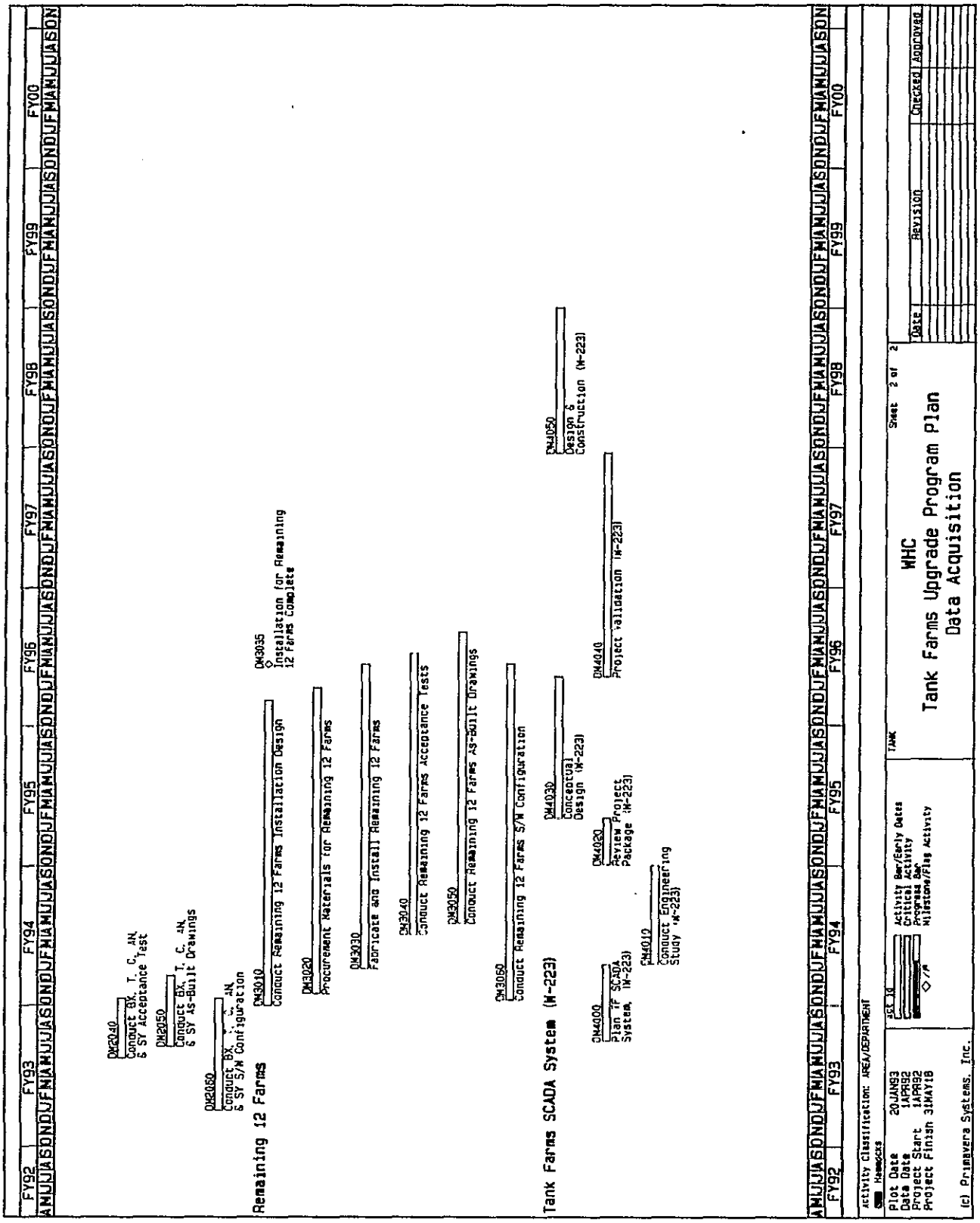


Figure 6.10-1. Data Acquisition Schedule.

Figure 6.10-1. Data Acquisition Schedule.



6.11 DATA MANAGEMENT

6.11.1 GOAL

The Data Management action plan has two goals:

- Ensure information quality and accessibility to meet business objectives
- Provide a Tank Farm management information system that will allow electronic access to tank farm data (instrument readings) for surveillance, engineering analysis, and reports.

6.11.2 SUMMARY ACTION PLAN

6.11.2.1 Data Management Plan. Data Management involves planning, organizing, operating, and controlling data resources that are vital to conducting business. Data Management establishes methods and tools and promotes an environment that recognizes the importance of applied data management practices. Although not an upgrade, data management is included here for completeness.

Tank Farm data will be managed by developing a comprehensive data management plan that will address the five major processes set forth by the Westinghouse Hanford Company (WHC):

- Strategic data planning consists of developing global data models, establishing data policies, assessing opportunities, and defining information planning strategies that are consistent with business requirements.
- Data administration consists of administering data management activities, establishing data standards, reviewing data for compliance with standards, and recommending data method.
- Data stewardship consists of assessing and maintaining data quality, developing working-level plans and procedures for managing data, monitoring data use, and controlling access to data.
- Data analysis and design consists of establishing information system scope, performing process and data analysis, and constructing logical and physical data models.

- Database administration consists of implementing and operating physical databases, ensuring integrity of data, and planning and operating the physical data environment.

6.11.2.2 Management Information System. A management information system will be provided as the central repository for Tank Farm sensor data. This system should also have interfaces to other site databases for information related to these sensor data. This information could include sensor calibration records, waste characterization information, geographical information, environmental data, and engineering drawings. The most logical approach at this time would be to expand the Surveillance Analysis Computer System (SACS), which is the existing management information system for Tank Farm surveillance data.

The SACS was first released in 1989 as a surface-level database to support tank farm surveillance efforts. This computer database provided electronic data storage and generated surface-level reports and graphs. In 1990, efforts began to design and develop a more comprehensive system to support other tank farm sensor databases and their associated reports. This system was planned to be developed in three phases. The first two phases were partial implementations of the system's functional requirements, giving users the most important functions necessary to do their work. The final phase will be a full implementation of the system's functional requirements. The following list describes primary deliverables that distinguish each development phase of this new comprehensive database system.

Phase 1 - Temperature Database System

Phase 2 - Surface-Level Database System for Radar, Tank Monitor and Control System (TMACS) interface, and Hand-Held Data Acquisition (HDAT) System interface

Phase 3 - Balance of the functional requirements specified in the SACS Temperature Database Software Requirements Specification, manual and surface levels, and other databases (e.g., mass spectrometer data, dry-well scan data, lateral scan data, liquid-observation-well readings).

Phase 1 has been completed and provides a generic, sensor database design expandable beyond temperature. Database tables, configuration forms, reports, and graphics developed in this phase furnish the basic building blocks to support multiple data types and interfaces for SACS.

Phase 2 was completed in November 1992 and meets the data management information system needs of the Instrumentation, Data Acquisition and Data Management action plans.

Phase 3 began in December 1992 and will include adding additional reports and databases to SACS to meet the needs of its users.

The use of SACS as the primary management information system for the Tank Farm upgrades requires two basic actions. The first action involves identifying the sensor data types that will be used in tank farms, identifying the report and graphs that the engineering analysts will need to perform their job, and implementing the appropriate databases, reports, and graphs. Because SACS will also continue to receive data automatically from TMACS and HDAT and manually from input screens, the second action involves modifying SACS in accordance with the expansion of these data sources.

6.11.3 JUSTIFICATION

6.11.3.1 Data Management Plan. WHC management has recognized data and information as valuable resources for the Company and its customers. The vision is to provide an environment where personnel will have the information needed to optimize their specific expertise and time. With this in mind, WHC has issued the following policy on data management:[1]

- Data and information will be managed from a business perspective
- Data will be collected only once
- Data standards will be established and enforced
- Data will be shared based on need
- Data and information will be controlled and protected
- Information quality will be actively pursued (WHC-CM-1-1).

6.11.3.2 Management Information System. Currently, large amounts of Tank Farm data are stored and accessed through paper media. Using paper media has proven to be too slow and cumbersome for surveillance engineers to perform their jobs properly.

An electronic management information system such as SACS is the best mechanism to store readings from the various Tank Farm data sources. These data must also be made readily available for timely analysis and review through various reports and graphs. With easy access to these data, responsible parties can have continuous knowledge of the current state of the Tank Farms and any trends that may lead to unfavorable conditions.

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[1]WHC-CM-1-1, *Management Policies*, Westinghouse Hanford Company, Richland, Washington.

After January 31, 1993, SACS will be operational with a surface-level database and a temperature database configured for S and SX Tank Farms. Other tank farms will come online as their configuration data are added. SACS has already been designed to interface with all the anticipated Tank Farm data sources, which include real-time data from TMACS, and manually-collected data from HDAT, and possibly (although not preferably) manually-collected data from data sheets. In addition, efforts are currently underway to connect SACS to the Tank Waste Information Network System, which is a U.S. Department of Energy information network for all of its defense waste facilities.

6.11.4 MILESTONES

- Define data management goals and objectives (September 1993)
- Identify data resources and information systems (March 1994)
- Develop process and develop data and business models (March 1994)
- Define overall plan for accessing information (August 1994)
- Design and develop architecture of the database management system and physical hardware (September 1995)

6.11.5 TIE-INS

- Data acquisition--A data management information system is affected by data acquisition because the acquired data will be sent to the data management information system.
- Information systems and data management planning--A data management information system, such as SACS, is driven by the business requirements derived from information systems and data management planning.

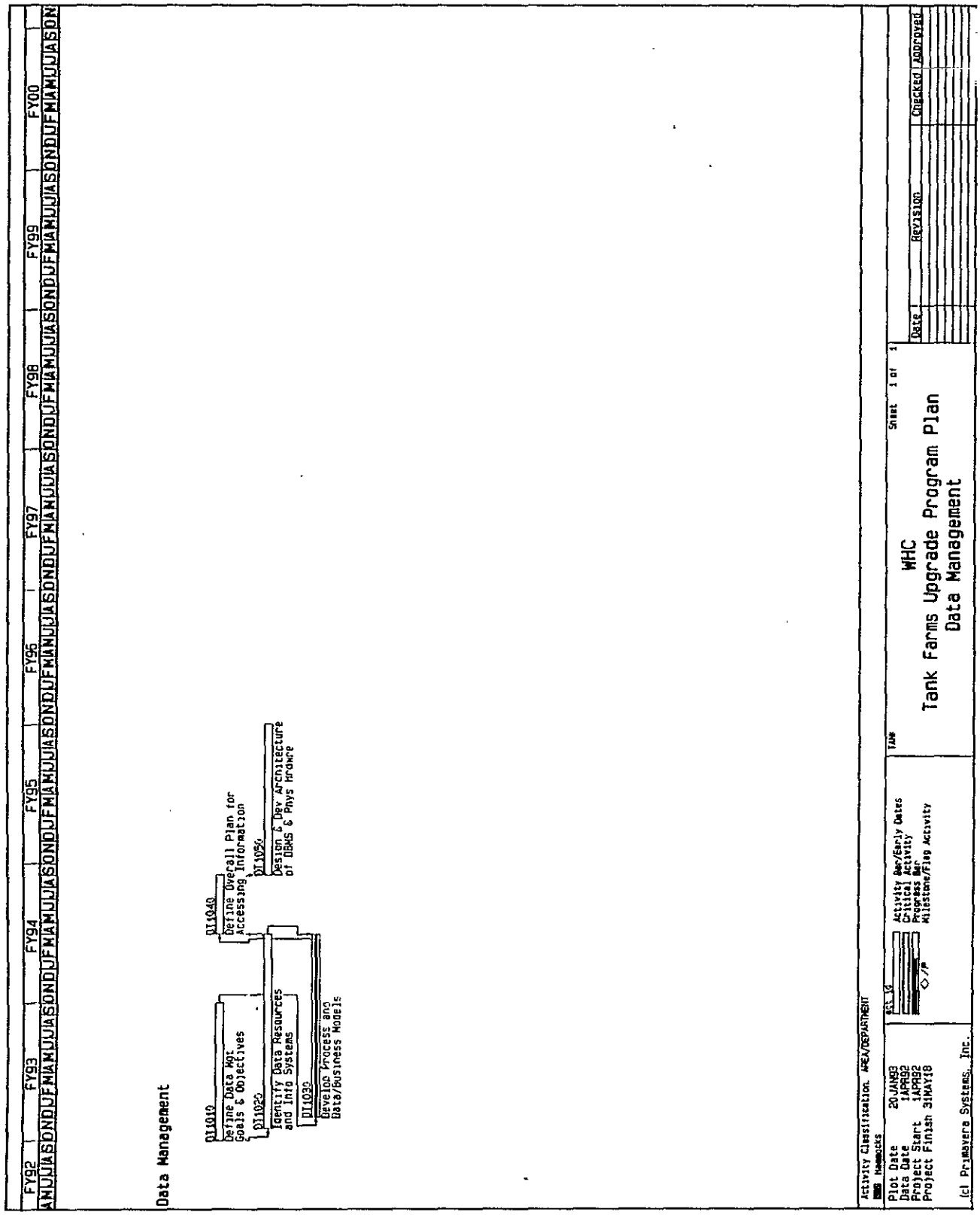
6.11.6 CONTINGENCIES

No major technical obstacles prevent implementation of this action plan. To date, a model for expansion of the system has been developed. One potential impact, however, is failing to complete a comprehensive data management plan for the Tank Farm upgrade.

6.11.7 SCHEDULE

Refer to Figure 6.11-1.

Figure 6.11-1. Data Management Schedule.



6.12 FACILITIES

6.12.1 GOAL

This action plan identifies and describes the necessary upgrades to Tank Farm facilities. Each upgrade supports the restoration of the facility to an acceptable design basis, the resolution of a safety concern, or a requirement of the cleanup mission. Facilities addressed in this plan include housing for mechanical and electrical equipment, maintenance shops, storage areas, control rooms, change facilities, and office buildings, as well as the tank farms and evaporators.

6.12.2 SUMMARY ACTION PLAN

The following projects will provide new facilities or improve the working conditions at the Tank Farms.[1,2,3]

- Project L-091, 200 East Office Facility, is an authorized 1994 Line Item (LI) that will provide an office building on a currently undeveloped site adjacent to the 200 East main parking lot. The building will house 260 people, the majority of whom are expected to be Tank Farms personnel.
- Project W-022, Regulated Equipment Maintenance Facility (in construction), will provide a facility for heavy- and light-duty equipment maintenance.
- Project W-116, Tank Farms East Operation Support Facility (in construction), will provide a 10-wide modular office facility for approximately 60 Tank Farms support personnel.

[1]Ohl, P. C., and G. Opitz, 1991, *Waste Tank Safety, Operations, and Remediation Strategic Plan*, WHC-EP-0501, Westinghouse Hanford Company, Richland, Washington.

[2]WHC, 1991, *Tank Farm Upgrades Program Plan*, WHC-EP-0392, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

[3]Osborne, J. W., 1992, *Program Plan for the Resolution of Tank Vapor Issues*, WHC-EP-0562, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Project W-182, 272-AW Building Addition, is a candidate General Plant Project (GPP) that will add 595 m^2 (6,400 ft^2) to Building 272-AW in the 200 East Area. The building will provide office space for Tank Farms operations support, safety and quality assurance, maintenance, and planning and scheduling personnel.

- Project W-188, Tank Farm Radiological Support Facilities, has been identified as a candidate LI, and is now proposed for inclusion in the Tank Farms Major System Acquisition (MSA) (W-314). The project will provide change facilities and access control for radiation workers in the 200 East and 200 West Tank Farms.

- Project W-225, Tank Farms Operations Support Facilities, was included as a proposed LI in earlier program plans and is still viable, although it has not yet been funded or scheduled. It will provide additional office space at the Tank Farms.

- Project W-226, Central Control and Maintenance Facilities (proposed for inclusion in Tank Farms MSA, W-314).

- Project W-264, Tank Farm Document Control Center 200 East, is an authorized capital work order (CWO) that will provide an 75 m^2 (800 ft^2) double-wide document control center in the 200 East Area.

- Project W-273, 90-Day Storage Pad, is an authorized CWO that will provide hazardous waste accumulation and storage areas. The project will include one temporary accumulation area (90-day pad), and two satellite accumulation areas (staging pads).

- Project W-280, Radiation Zone Area Lighting Upgrade, is a proposed 1994 GPP. The results of the engineering study (now being prepared) will be used to determine the extent and the schedule of the required upgrades. Several GPPs may be required to complete the upgrades in phases.

- Project W-282, Tank Farm Document Control Center 200 West, is an authorized CWO that will provide an 75 m^2 (800 ft^2) double-wide Document Control Center in the 200 West Area.

- Project W-287, Portable Exhauster Maintenance Facility 200 West, is a proposed GPP to provide a maintenance and repair facility for contaminated exhausters and other equipment in the 200 West Area.

- Project W-288, Portable Exhauster Maintenance Facility 200 East, is a proposed GPP to provide a maintenance and repair facility for contaminated exhausters and other equipment in the 200 East Area.

The requirements for the above projects are based on current operational needs and do not address the needs of the cleanup mission. The sequence of Tank Farm closure activities and the estimated staffing levels to support those activities have not been determined. Additional personnel are expected to require additional office and shop space beyond the facilities provided by the above projects. The schedule for change facilities to be added under the proposed MSA (W-314 or by Project W-188) must be examined, and revised if necessary, to accommodate the retrieval program schedule. Waste accumulation and storage areas, in addition to those provided by Project W-273, may be needed to support the retrieval effort.

Buildings that house Safety Class 2 and 3 equipment must be evaluated to determine whether they meet applicable environmental hazard protection requirements. In some cases, the existing buildings should be demolished and new buildings should be provided, possibly in different locations, to improve maintainability and operability of the equipment inside. For example, the 241-BX/BY Compressor Building is in a contamination zone, making operation and maintenance of the compressor difficult and causing unnecessary exposure of personnel to hazardous conditions. Currently, no plans to correct this problem exists.

Several ongoing facility upgrades include replacing friable asbestos at selected Tank Farm facilities, removing service piping and associated mechanical systems that are no longer required to support Tank Farm operations, and applying protective paint and labels to Tank Farm components and equipment. These activities are funded year to year.

The removal and/or remediation of high radiation sources and contaminated surface soil at the Tank Farms have been identified as a necessary upgrade.

Two candidate MSAs (Projects 236A and 260) will provide new double-shell tank farms. The necessary capacities and locations of these facilities have not been determined. Construction of both facilities will be completed in fiscal year (FY) 1999. Another candidate MSA, Project W-236B, will provide an initial pretreatment module. The engineering study for that project is being prepared. These three MSAs (Projects 236A, 236B, and 260) are not funded as part of the upgrades program, but are mentioned here to complete the picture of Tank Farms.

6.12.3 JUSTIFICATION

Projects L-091, W-116, W-182, W-225, W-226, W-264, and W-282 are proposed in response to a number of Tiger Team observations and the corporate Westinghouse Technologies to Improve Processes (WesTIP) Team recommendations. The operations and support facilities provided by the projects directly support improvements in conduct of operations by providing work space and equipment for better integration and coordination between operations, engineering, maintenance, and other support staff in the tasks associated with operating and maintaining the Tank Farms.

In most cases, Tank Farm change facilities are nonexistent in the 200 West Area Tank Farms and, at best, inadequate in the 200 East Area Tank Farms. New facilities provided by Project W-188 at each Tank Farm complex would support current operation as well as future upgrades and/or closure tasks that will occur at each farm.

Maintenance facilities and associated equipment required to perform daily tasks are outdated, resulting in delayed completion of routine maintenance tasks. Projects W-022, W-287, and W-288 will alleviate this problem by providing improved maintenance facilities.

Project W-273 is necessary for compliance with the *Washington Administrative Code* (WAC) 173-303.[4]

Project W-280 will eliminate a safety concern by replacing the yellow lights that make color perception difficult and that can lead to errors in reading the color-coded caution tags and danger tags.

The remaining facility upgrades identified in Section 6.12.2 are driven by as low as reasonably achievable (ALARA) considerations because they will result in safer working environments for Tank Farm personnel. The upgrades will also bring the facilities into compliance with environmental regulations, U.S. Department of Energy (DOE) directives, Washington State laws, national standards, and other applicable requirements. An additional benefit of improving the safety of the facilities is the removal of many workplace restrictions, which will result in increased efficiency and greater productivity on the part of the workers.

6.12.4 MILESTONES

- Complete Project L-091, 200 East Office Facility. Funding: 1994 LI. Responsibility: Landlord Projects. Scheduled completion date: June 30, 1997.

- Complete Projects W-264 and W-282 to provide Tank Farm Document Control Centers at 200 East and 200 West. Funding: CWO. Responsibility: Tank Farm Projects. Scheduled completion date: April 16, 1993.

- Complete Project W-116, Tank Farms East Operations Support Facility. Funding: 1991 GPP. Responsibility: Tank Farm Projects. Scheduled completion date: February 26, 1993.

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[4]WAC 173-303, 1990, "Dangerous Waste Regulations", *Washington Administration Code*, as amended.

- Complete Project W-022, Regulated Equipment Maintenance Facility. Funding: 1989 GPP. Responsibility: Tank Farm Projects. Scheduled completion date: June 1, 1993.

- Complete design of Project W-273, 90-Day Storage Pad. Funding: CWO. Responsibility: Tank Farm Projects. Scheduled completion date: December 18, 1992. (Construction has not been scheduled pending completion of the environmental and safety analyses.)

- Decide whether Project W-182, 272-AW Building Addition, is still needed. Responsibility: Tank Farm Operations, Tank Farm Projects. (The schedule for completing the project has not been developed pending the outcome of the decision.)

- Decide whether to fund completion of the engineering study for Project W-280, Radiation Zone Area Lighting Upgrade. Responsibility: Tank Farm Engineering Integration. Scheduled completion date: (The schedule for completion of the project has not been developed pending completion of the study.)

- Complete Projects W-287 and W-288 to provide Portable Exhauster Maintenance Facilities at 200 East and 200 West. Funding: 1993 GPP. Responsibility: Tank Farm Projects. Scheduled completion date: September 30, 1994.

- Evaluate the buildings that house Safety Class 2 and 3 equipment to determine whether they provide adequate protection against natural forces (e.g., earthquake, wind). Responsibility: Plant Support Engineering. Scheduled completion date: September 30, 1995.

- Replace asbestos in 241-SX-701 and in AX and AY Tank Farms. Funding: Major Maintenance Upgrades. Responsibility: Major Maintenance. Scheduled completion date: May 28, 1993.

- Identify piping and equipment to be removed from 241-B and 241-S Tank Farms. Funding: Major Maintenance Upgrades. Responsibility: Major Maintenance. Scheduled completion date: August 30, 1993.

- Plan surface soil decontamination activities at 241-BX and 241-BY Tank Farms. Funding: Major Maintenance Upgrades. Responsibility: Major Maintenance. Scheduled completion date: August 3, 1993.

- Develop the scope of Tank Farms Major Systems Acquisition, which will probably include Projects W-188, W-225, and W-226. Responsibility: Tank Farm Projects, Tank Farm Project Definition. Scheduled completion date: September 30, 1993.

6.12.5 TIE-INS

- Data Acquisition--The Central Control and Maintenance Facility (W-226) may be the most desirable location for the data acquisition operator interface; therefore, a tie-in exists with data acquisition.

- Mechanical Utilities, Electrical Utilities--Buildings that house equipment such as compressors and electrical switchgear should be evaluated to determine whether they require upgrades to withstand natural forces, to accommodate heat-load changes that could affect the buildings' heating, ventilation, and air conditioning systems, and to relocate the equipment outside contamination zones. Where equipment upgrades are planned, any necessary facility upgrades should be performed at the same time as the equipment upgrades.

- Conduct of Operations--New control rooms and shift managers' offices are needed to respond to Tiger Team findings.

- Conduct of Engineering--Co-location plans require the addition of engineering office space at the Tank Farms.

- Maintenance Management Programs--The need for additional office, shop, and storage space has been identified as a necessary upgrade to enhance Maintenance Management Programs.

6.12.6 CONTINGENCIES

- Additional facilities will be needed to support the retrieval mission. The requirements for these facilities have not been defined.

- Decisions must be made on whether to continue with certain projects. Those projects, and the details of the decision to be made, are described in Section 6.12.4.

6.12.7 SCHEDULE

Refer to Figure 6.12-1.

Figure 6.12-1. Facilities Upgrades Schedule.

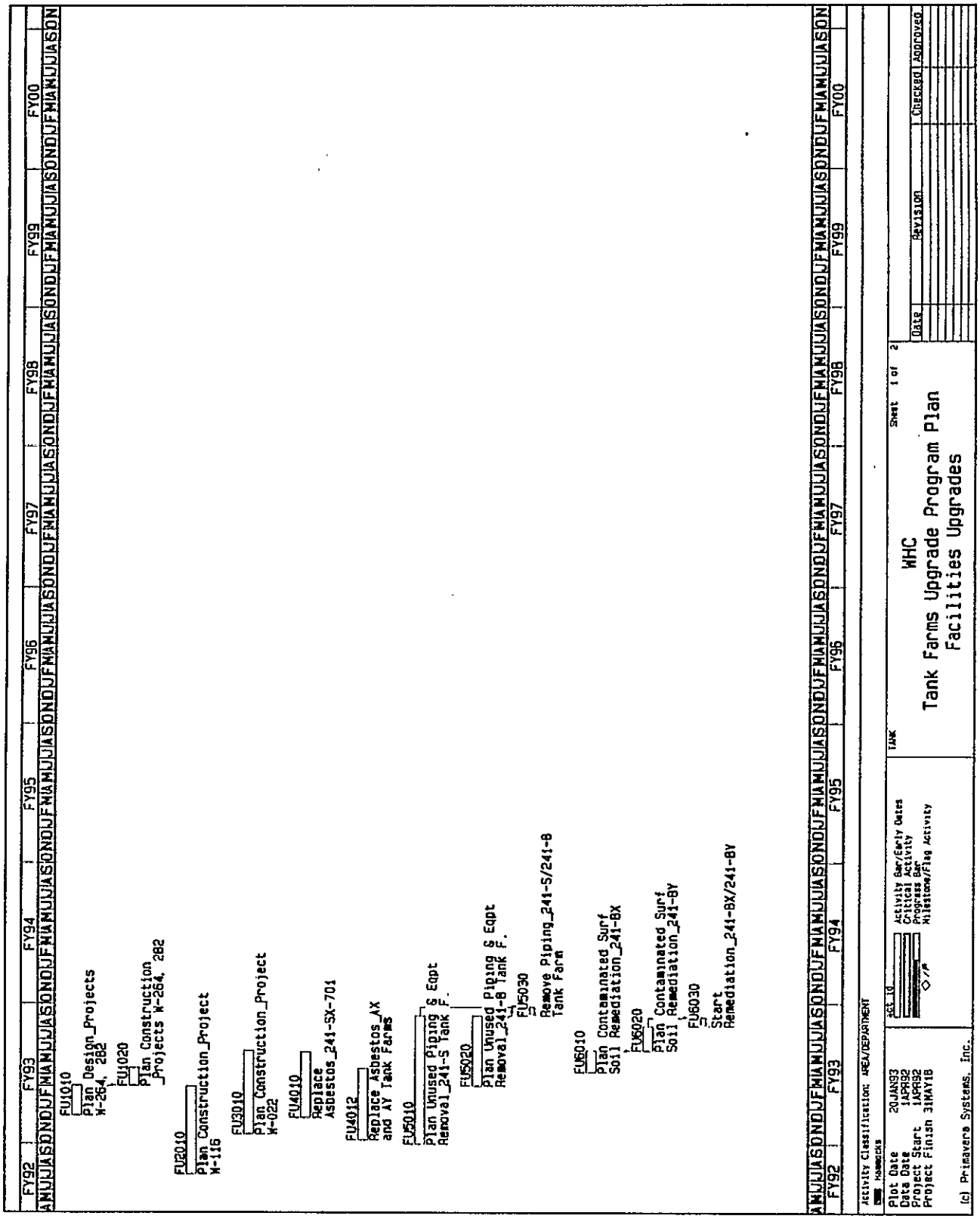
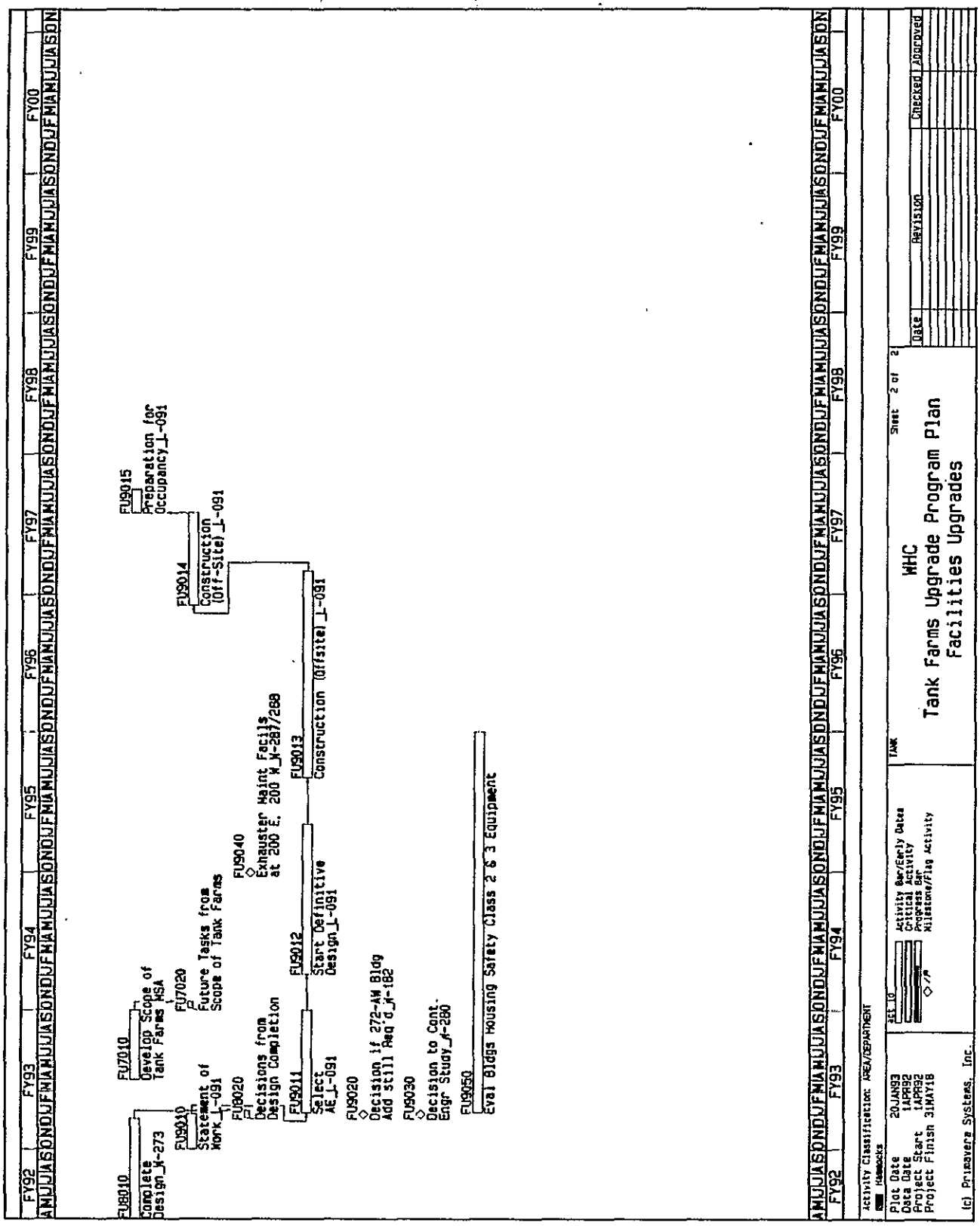


Figure 6.12-1. Facilities Upgrades Schedule.



6.13 VENTILATION

6.13.1 GOAL

This action plan identifies and describes the upgrades necessary for the restoration of Tank Farm ventilation systems to acceptable design bases. In addition, ventilation upgrades required for resolution of safety concerns, continued operation within the safety envelope, and the retrieval and cleanup mission are discussed. Included in this action plan are active and passive ventilation systems and components for single-shell tanks (SST), double-shell tanks (DST), and evaporators.

6.13.2 SUMMARY ACTION PLAN

241-AY and 241-AZ Tank Farms--Project W-030 has been initiated to design and replace the primary tank ventilation systems for Tank Farms 241-AY and 241-AZ; the design is 30 percent complete. The system will maintain flow rates of 11 to 28 m^3/min (400 to 1,000 ft^3/min) per tank. In addition, the system will remove heat at a rate of approximately 1,000,000 Btu/hr per tank. The heat will be removed by the flow of air through the tanks and a closed-loop recirculation and cooling system. Capital funding for this project has been secured.

Double-Shell Tank Farms--Because of noncompliance with existing regulations, the continued safe operation of the ventilation systems cannot be guaranteed through the DST waste disposal mission. The ventilation systems for the AN, AW, and SY DST farms are known to require upgrading or replacement. Also, an engineering study has been initiated to evaluate the condition of all the DST ventilation systems and to identify the specific upgrades for each system. The engineering study is part of Project W-061, which also includes the design and construction efforts. This project is part of the proposed major system acquisition (MSA) (W-314) and is to be funded from money obtained for the MSA.

241-SY Ventilation Upgrades--Two additional (near-term) upgrades are planned for the 241-SY primary tank ventilation system. The first upgrade is the procurement and installation of spark resistant fans for the primary tank (K1) and backup (P-28) ventilation systems. The second upgrade is the design, procurement, and installation of a new exhauster to replace the P-28 exhauster. Upon installation, the new exhauster will be the primary exhauster and the existing K1 will be the backup. These two upgrades are funded with capital-equipment-not-related-to-construction (CENRTC) money, they are not within the scope of 1N3 but are included for information.

SX Tank Farm--The ventilation system for the SX SST farm has been in operation since approximately 1954. The system is in extremely poor physical condition and excessive maintenance is required for continued operation. Some major system components are in such disrepair that they have been removed from service or patched together and returned to service. For example, the steam heater has been removed from service because of operational problems, and the cracked exhaust stack has been clamped together to allow continued operation of the ventilation system. The design of a replacement ventilation system is nearly complete; however, all work has been halted on the design and replacement effort because funds are lacking. Work on this upgrade and/or replacement will not continue until additional funding has been identified and secured.

Tanks 241-A-105 and 241-A-106--Currently, Tanks 241-A-105 and 241-A-106 are ventilated using a 200 m^3/min (7,000 ft^3/min) portable exhauster, and a replacement ventilation system is required. The new system will be installed, capable of providing the appropriate flow-rate and heat-removal confinement, and monitoring capabilities.

Ferrocyanide Watchlist Tanks--Twenty-four SSTs have been identified as containing ferrocyanide, which is flammable at elevated temperatures. The passive ventilation system for these tanks consists of breather filters. The breather filters contain high-efficiency particulate air (HEPA) filter media to prevent the release of particulates to the environment. The vapors in the tanks are vented by the pressure difference in the tank vapor space and the atmosphere. The upgrade plan for these tanks is to replace the passive ventilation system with active systems. The active ventilation systems will maintain the concentrations of flammable gases below flammability concentration. An active ventilation system will be installed on each of the ferrocyanide Watchlist tanks, with some systems ventilating more than one tank. Capital funding will be required for the design, procurement, and installation of the new ventilation systems.

Organic Watchlist Tanks--Eight SSTs have been identified as containing organic vapors that pose worker health hazards. These tanks are being ventilated by passive breather filters. The breather filters will be removed, and an active ventilation system will be installed on each tank. The ventilation systems will contain special organic filters to prevent the release of the vapors to the environment. The vapors in the tanks must be characterized to ensure that the proper filtration medium is designed into the ventilation system. Capital funding is required for the new systems.

Hydrogen Watchlist Tanks--Eighteen SSTs and six DSTs have been identified as generating significant amounts of hydrogen gas. Seven of the SSTs and all of the DSTs have active ventilation systems. These systems will be upgraded by replacing components that are potential ignition sources or replacing the entire ventilation system. The new components and systems will be designed to avoid potential ignition sources. The SSTs that are ventilated passively will be upgraded to active ventilation by Project W-230, Hydrogen SST HVAC Upgrades. Project W-230 is part of the proposed MSA (W-314).

242-A Evaporator--The 242-A Evaporator recently underwent a major facility upgrade (Project B-534). The facility upgrade project originally included replacement of the HVAC system, but a scope revision resulted in dropping that portion of the project. The HVAC upgrade will be completed as Project W-085. The scope of Project W-085 includes replacement of the 242-A building heating, ventilation, and air conditioning (HVAC) system, the process ventilation system, the primary condensor, and the facility loadout station. In addition, the system control software will be upgraded to accommodate the new hardware systems.

This upgrade is not within the scope of 1N3 but is included here for information.

General--All of the ventilation systems may require upgrading to allow HEPA filter testing, stack flow testing, and psychrometric testing within national standards and site-specific criteria. All of the ventilation systems and test procedures are being evaluated to identify areas of deficiencies. Upon completion of the evaluation, the procedures will be revised and the physical upgrades will be prioritized.

6.13.3 JUSTIFICATION

241-AY and 241-AZ Tanks Farms--The existing ventilation system for 241-AY and 241-AZ Tank Farms was originally constructed to ventilate SSTs and had a design life of 30 years. The system is approximately 37 years old and requires a significant amount of maintenance for continued operation. The system does not comply with the governing U.S. Department of Energy (DOE) orders, national codes and standards, *Code of Federal Regulations*, and Washington State regulations for nonreactor nuclear facilities. In addition, the existing system does not comply with the design basis accident criteria for safety-class systems.

Double-Shell Tank Farms--This project is required to ensure the safe operation of the DST ventilation systems in support of the waste retrieval and disposal mission. In addition, the upgrades to these ventilation system will ensure compliance with DOE design criteria, *Resource Conservation and Recovery Act of 1976*[1] containment regulations, and American Society of Mechanical Engineers design and testing requirements.

241-SY Ventilation Upgrades--The near-term upgrades of the SY ventilation system are required to reduce its potential to cause a hydrogen ignition. Two of the three tanks (241-SY-101 and 241-SY-103) ventilated by K1 and P-28 produce hydrogen gas. During a Tank 241-SY-101 tank burp, the potential exists for flammable concentrations of hydrogen gas to occur in the ventilation systems. The spark-resistant fans will eliminate the potential of spark production during catastrophic failure of the fans. Likewise, the new ventilation system will be intrinsically safe. In addition, the new exhauster will be a permanent replacement for the temporary P-28.

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[1]*Resource Conservation and Recovery Act of 1976*, 42 U.S.C. 6901, et seq.

SX Tank Farm--The SX Tank Farm ventilation system is in poor physical condition and the continued safe operation cannot be guaranteed. The system requires excessive maintenance and some major components are in disrepair or out of service. The system does not comply with the governing DOE orders, national codes and standards, *Code of Federal Regulations*, and Washington State regulations for nonreactor nuclear facilities. In addition, the existing system does not comply with the design basis accident criteria for safety-class systems.

Tanks 241-A-105 and 241-A-106--The existing ventilation system is rated at 200 m^3/min (7,000 ft^3/min). Because of the configuration of air inlet into the tanks, the ventilation system must be throttled down to the point where continued operation is difficult to maintain without exceeding pressure limits in the tanks. The reduced flow through the ventilation system makes integrity testing of the HEPA filters difficult and is not in compliance with national HEPA filter testing code. Furthermore, the system does not comply with the confinement and monitoring requirements of the *Code of Federal Regulations*. Funding is not available to start the design effort for a replacement system. Therefore, no work has been initiated on this activity.

Ferrocyanide Watchlist Tanks--The passive ventilation systems installed on these tanks cannot ensure the concentration of flammable gas is maintained below flammability limits. The potential for the flammable concentrations of gas to exist in the tanks creates a safety hazard. To maintain the tanks in a safe operating condition, the flammable gas must be removed from the tanks. Active ventilation systems will provide a positive method of removing gas for the tanks and maintain the flammable gas below flammability concentrations. The active ventilation systems will be required on these tanks until the flammable gas generation is mitigated or the waste has been retrieved.

Organic Watchlist Tanks--Unfiltered organic vapor presents a serious health concern to operational and maintenance personnel. The present HEPA breather filter assemblies filter out particulates only. Organic vapors pass through the filters. Dangerous concentrations of these vapors are being expelled from the tanks, which requires personnel performing work on or around these tanks to wear supplied breather air. Active ventilation systems with the appropriate filtration will allow personnel to work without respirators, which will reduce the risk of personnel injury, reduce the time required to complete work, and improve worker morale.

Hydrogen Watchlist Tanks--Hydrogen gas in concentrations above 4 percent in air are flammable and can be ignited by very little energy. Hydrogen gas ignition in the waste tanks and ventilation system is a major safety concern. Active ventilation systems are required for passively ventilated tanks to prevent buildup of flammable concentrations. The existing active ventilation systems will be upgraded or replaced so that all components (e.g., pressure switches, heaters, fan) are intrinsically safe.

242-A Evaporator--DOE Order 6430.1A[2] requires that additions or modifications to a facility shall comply with the order and with the latest editions of its references. The existing HVAC system at the 242-A Evaporator does not comply with the order or the latest standards and, because the facility was modified, the HVAC system must be upgraded.

General--The procedures used by Tank Farm personnel for in-place leak testing of HEPA filters, stack-flow testing, and psychrometric testing are not in compliance with national standards and site-specific criteria. Because the in-place leak testing procedures are noncompliant, integrity of the filters cannot be verified adequately.

6.13.4 MILESTONES

Project W-030, Tank Farms Ventilation Upgrades (241-AY and 241-AZ Tank Farms)

- The design of the new ventilation system is scheduled to be completed in April 1994.
- Construction is scheduled following the completion of the design and will be finished by January 1996.
- The ventilation system is scheduled to be turned over to operations personnel in April 1996, following the completion of acceptance and operational testing.

Project W-061, Double-Shell Tank Ventilation System Upgrade

- The engineering study is to be completed by January 30, 1993.
- Conceptual design is to commence in April 1993 and conclude in February 1994
- Definitive design of the upgrades is to commence in January 1996 and conclude in June 1997
- Procurement and site preparation are scheduled to begin in March 1997, 3 months before the completion of the definitive design. This parallel fast-track effort will allow the construction to be completed by December 1998.
- The ventilation systems will be turned over to operations personnel as the systems finish acceptance and operational testing. Testing of the last system is scheduled to be completed by January 1999

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[2]DOE, 1989, *General Design Criteria*, DOE Order 6430.1A, U.S. Department of Energy, Washington, D.C.

241-SY Ventilation Upgrades

- Order spark-resistant fans in April 1993
- Vendor starts fabrication in August 1993 and completes fabrication in April 1994
- Prepare site for installation of spark-resistant fans in May 1994
- Install and test spark-resistant fans in June 1994
- Issue purchase requisition for new exhauster in September 1993.

SX Tank Farm

- Based on the length of time until waste retrieval, a cost-benefit decision must made on whether upgrading individual components or replacing the entire system is most appropriate. The waste retrieval schedule is scheduled to be completed in March 1993.
- Identify and secure funding for component upgrading or system replacement - TBD.

Tanks 241-A-105 and 241-A-106

- Based on the length of time until waste retrieval, a cost-benefit decision must made on whether upgrading individual components or replacing the entire system is most appropriate. The waste retrieval schedule is scheduled to be completed in March 1993.
- Identify and secure funding for component upgrading or system replacement - TBD.

Ferrocyanide Watchlist Tanks

- Start design and procurement of ventilation systems in 1993.
- Start installation of ventilation systems in 1994.
- Complete procurement and installation of ventilation systems in 1998.

Organic Watchlist Tanks

- Vapor characterization of the first organic tank (241-C-103) is scheduled to be completed by March 1993.
- Start best available control technology selection in March 1993.

Hydrogen Watchlist Tanks

- Start design and procurement of ventilation systems in 1993.
- Start installation of ventilation systems in 1994
- Complete procurement and installation of ventilation systems in 1998.

242-A Evaporator

- Preliminary engineering study from March 1993 through September 1993
- Functional design criteria from October 1993 through June 1994
- Conceptual design from June 1994 through June 1995
- Definitive design from January 1997 through June 1998
- Construction from July 1998 through December 1999.

General

- The HEPA-filter, stack-flow, and psychrometrics test procedures will be revised and issued by January 1996.
- The physical upgrades for all the ventilation systems will be identified by January 1996.

6.13.5 TIE-INS

Tank Farms 241-AY and 241-AZ

- A tie-in with mechanical utilities exists because of the elimination of the current emergency cooling system.

SX Tank Farm

- Before the resumption of the design effort for a replacement ventilation system, the forthcoming waste tank retrieval schedule must be examined. The retrieval schedule will indicate the anticipated date and duration of waste retrieval from SX Tank Farm. From this indicator of life expectancy for the SX Tank Farm, a knowledge-based decision can be made on the cost benefit of upgrading individual components or replacing the system.

- The electrical power system must be evaluated and upgraded as necessary to ensure sufficient electrical power.

Tanks 241-A-105 and 241-A-106

- The electrical power system must be evaluated and upgraded as necessary to ensure sufficient electrical power.

- Before the design effort for a replacement ventilation system begins, the forthcoming waste tank retrieval schedule must be examined. The retrieval schedule will indicate the anticipated date and duration of waste retrieval from these tanks. From this indicator of life expectancy for the tanks, a knowledge-based decision can be made on the cost-benefit of upgrading the system.

Ferrocyanide Watchlist Tanks

- A proven method of tank vapor characterization is required before new ventilation systems are designed. The vapor characterization is required for the design of the vapor filtering media, which must filter hazardous vapors from the ventilation system exhaust. A vapor characterization method is anticipated to be proven by March 1993.

- The electrical power system must be evaluated and upgraded as necessary to ensure sufficient electrical power.

- Before the design effort for a replacement ventilation system begins, the forthcoming waste tank retrieval schedule must be examined. The retrieval schedule will indicate the anticipated date and duration of waste retrieval from these tanks. From this indicator of life expectancy for the tanks, a knowledge-based decision can be made on the cost-benefit of upgrading the system.

Organic Watchlist Tanks

- The electrical power system must be evaluated and upgraded as necessary to ensure sufficient electrical power.

- Before the design effort for a replacement ventilation system cam begin, the forthcoming waste tank retrieval schedule must be examined. The retrieval schedule will indicate the anticipated date and duration of waste retrieval from these tanks. From this indicator of life expectancy for the tanks, a knowledge-based decision can be made on the cost benefit of upgrading the system.

Hydrogen Watchlist Tanks

- The electrical power system must be evaluated and upgraded as necessary to ensure sufficient electrical power.

- Before the design effort for a replacement ventilation system can begin, the forthcoming waste tank retrieval schedule must be examined. The retrieval schedule will indicate the anticipated date and duration of waste retrieval from these tanks. From this indicator of life expectancy for the tanks, a knowledge-based decision can be made on the cost-benefit of upgrading the system.

6.13.6 CONTINGENCIES

- The ventilation systems for ferrocyanide, organic, and hydrogen Watchlist tanks depend on vapor characterization results. Washington State law requires characterization of potential air pollution sources. A new vapor characterization method will be tested in Tank 241-C-103. If the new characterization method is successful, the other tanks will be characterized by the same method. Vapor characterization must be performed on tanks previously unventilated or unventilated for 5 or more years.

- Funding and schedule for the three categories of Watchlist tank ventilation systems may be affected by the forthcoming waste retrieval schedule. Depending on the time until retrieval and the planned ventilation upgrade, the ventilation upgrade for some tanks and farms may be canceled and allowed to exist as is until retrieval.

6.13.7 SCHEDULE

Refer to Figure 6.13-1.

Figure 6.13-1. Ventilation Upgrades Schedule.

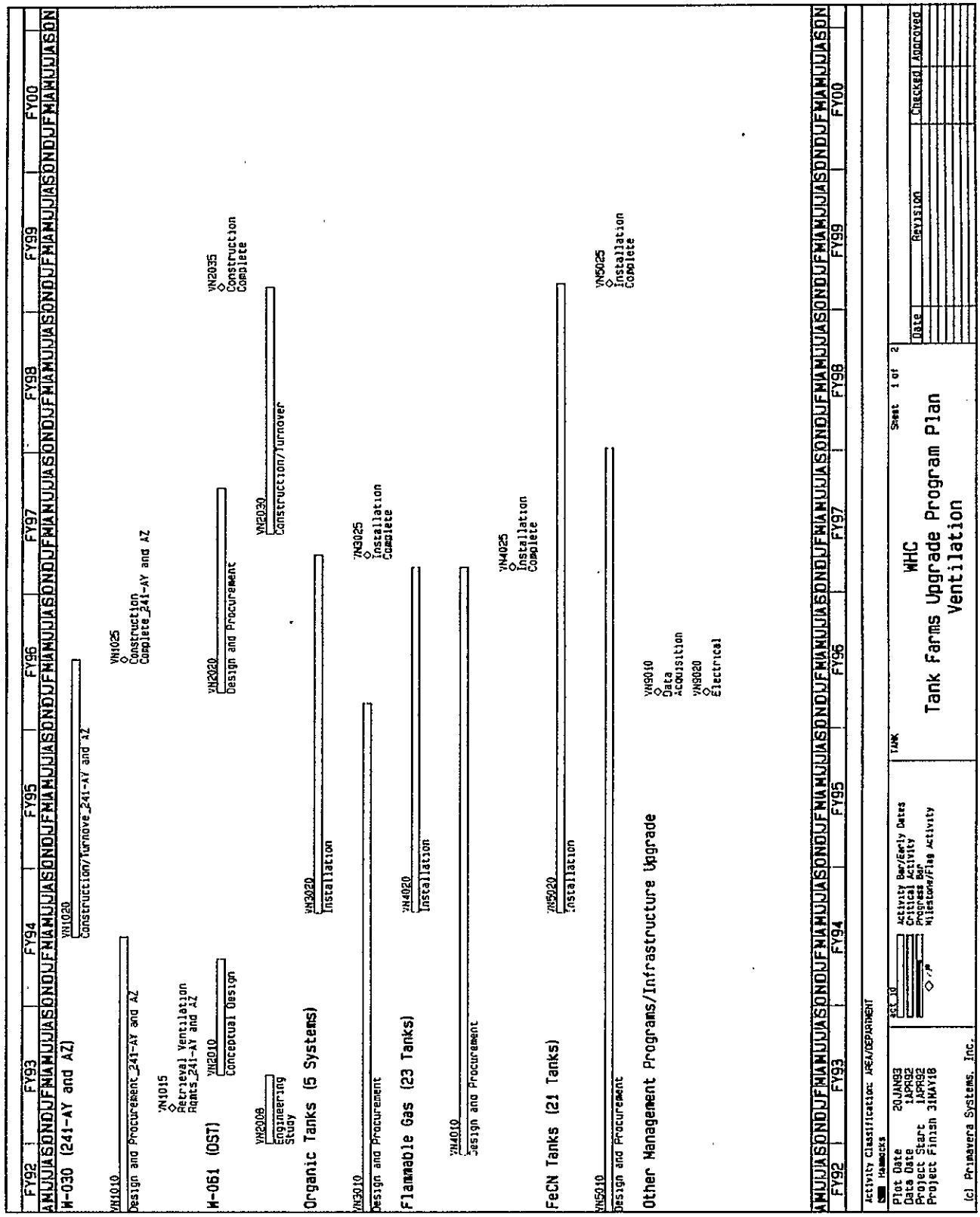
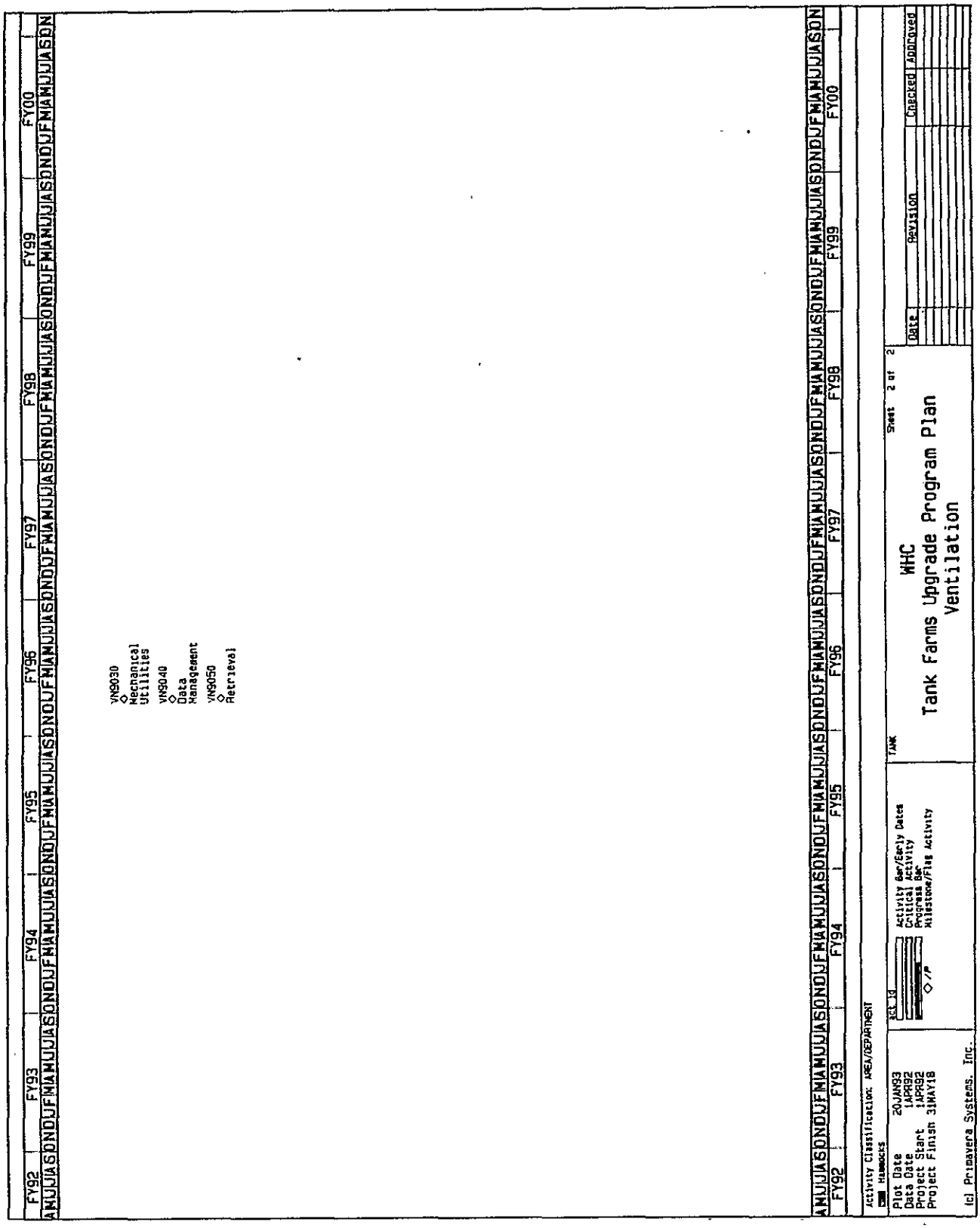


Figure 6.13-1. Ventilation Upgrades Schedule.



6.14 ELECTRICAL DISTRIBUTION/UTILITIES

6.14.1 GOAL

The goal of the Electrical Distribution/Utilities action plan is to provide necessary upgrades to the electrical power distribution systems in Tank Farms. These upgrades are required to restore the system to an acceptable design basis, to resolve safety concerns, and support the cleanup mission. Tank Farm's electrical distribution system starts at the utility interface points and ends at the actual loads in the tank farms.

6.14.2 SUMMARY ACTION PLAN

The electrical distribution system upgrades are to be covered in proposed Project W-203, Tank Farm Electrical Upgrade. Currently, there is no funding for this project, but it is planned as part of the major systems acquisition proposal (W-314).

The electrical essential drawings (one line drawings and some major control circuit drawings) have been updated by field verification, but only a few of the remaining drawings have been started. Short circuit and protective relay coordination studies have been completed for 242-A Evaporator only; the rest of Tank Farms must be done.

Five new substations should be installed to replace the existing ones now serving the Tank Farms. These substations would be at S Complex, A Complex, AW/AP, B, and T Tank Farms. Additional upgrades in the Tank Farms include replacing the motor control centers at C Tank Farm and the 701-A Building and installing electrical ducts in the farms.

6.14.3 JUSTIFICATION

The present electrical distribution system was installed in pieces as each tank farm was built or modified. Each system was designed to different specifications, which has resulted in an inconsistent system with three different grounding methods and both wye- and delta-final distribution methods. These inconsistencies have impaired reliability, and the system is difficult to maintain or expand. Most of the equipment is old, and repair or replacement parts can be hard to find.

The National Electric Code requires that all systems be coordinated. Tank Farms does not have the short circuit and protective relay coordination studies needed to show that this requirement has been satisfied. These studies would also evaluate the capacity and level

of protection needed to support the final safety analysis reports for power to Safety Class 1, 2 and 3 systems. The studies would define the protection required to limit equipment damage and the extent of an electrical outage caused when clearing a fault. Lack of an actual study does not indicate that the system is not coordinated, but past experiences have shown that the Tank Farms systems do have problems.

Tank Farms electrical power is provided by four utility lines: two in the 200 East Area and two in the 200 West Area with one or more connections in each Tank Farm. These connections are either pole- or pad-mounted transformers ranging from 50 kVA to 1,000 kVA. These transformers and the associated switchgear can be replaced with five substations, with each substation connected to two power lines. The dual-line access will increase reliability and allow maintenance of the power system without interrupting the power.

The power is routed to each load through various panelboards, controllers, and cables. The panelboards and controllers allow for expansion, but for the most part, this expansion capacity has been used. This equipment will have to be expanded or replaced to handle the new or larger loads planned for retrieval and other projects. The pumps and exhausters are connected with direct-buried cable (except for AP Tank Farm, which uses wires in conduit). These cables have an estimated lifetime of 30 years, and a few fail each year. To replace a failed cable, a new trench must be hand-dug through potentially contaminated soil from the control building to the load. These cables cannot be expected to last through the retrieval process, but it would be too costly to replace them in total. To continue replacing each cable after it fails is also costly. The proposed option would be to install a covered cable duct in each tank farm that would give access from the control buildings to points near the loads. Then when a cable needs replacing, only a short trench would be required with the rest of the replacement cable being routed in the duct.

6.14.4 MILESTONES

- Create a relay coordination study of each Tank Farm electrical substation and load - March 1996
  - Update the drawings - September 1995
  - Correct the deficiencies found - March 1996
- Upgrade S Complex substation - September 1999
  - Design upgrades
  - Install external electrical upgrades
  - Tie-in SY, S, SX, and 242-S tanks
  - Add U Tank Farm
  - Install in-farm upgrades

- Upgrade the A Complex substation - March 2000
  - Design upgrades
  - Install external electrical upgrades
  - Tie-in 701-A, A, AX, AY, and AZ
  - Extend to AN and C Tank Farms
  - Install in-farm upgrades
- Install a new substation for AW, AP, 242-A, 204-AR, and 244-AR Tank Farms - fiscal year (FY) 2001
  - Install in-farm upgrades
- Install new substations for B, BX, and BY Tank Farms, and T, TX, and TY Tank Farms - FY 2002
  - Internal work in the tank farms.

6.14.5 TIE-INS

- **Steam Systems**--Replacing all or parts of the steam heating loads with electric heat is being studied. The extent of this replacement will affect the amount of electricity required for that project.
- **Compressed Air Systems**--Currently, the air system at 701-A building is Safety Class 2. If this system is reduced to Safety Class 3, the electrical requirements would be reduced greatly, including the possible elimination of a new generator.

  Because of the environmental requirements, the compressors with once-through cooling systems are being replaced with closed-loop cooling systems. The new cooling systems require more power to run the additional pumps and fans.

  Studies are to be made on the air usage before additional compressors are replaced. The results of these studies will determine the effect on the electrical distribution system.
- **Heating, Ventilation, and Air Conditioning Upgrades**--A study is being prepared to determine the ventilation requirements for single- and double-shell tanks. Exhausters require considerable power, and any new exhausters will greatly affect the electrical distribution system. All of the single-shell tank farms would require electrical upgrades to support any new exhausters.

- **Instrumentation**--The electrical installation will greatly simplify instrumentation upgrades, both in cost and time. Additional instrumentation added may require additional electrical capacity.

- **Facilities**--Most of the buildings in which the electrical switchgear is located are not qualified seismically. During an earthquake, these structures could damage the electrical equipment, rendering it inoperable. These buildings need to be upgraded or replaced.

  The AY and AZ motor control centers are located inside radiation zones. The centers need to be relocated outside the radiation zones to make maintenance and repairs more accessible.

- **Waste Transfer**--Several of the waste transfer pumps may be increased from 20 to 30 hp. The resizing is determined by the pump requirements and availability; resizing can require considerable changes, including increasing the wire, starter, and breaker sizes.

- **Retrieval**--Mixing Pumps may be required in existing DSTs to support the retrieval effort, which could have a major impact on total power requirements.

6.14.6 CONTINGENCIES

- This plan does not include the repairs needed to answer the findings in the Site electrical assessment. Most of these findings are National Electric Code violations and are maintenance items.

- This plan does not supply power for the single-shell tank retrieval operations. The current plans are for the retrieval program to provide the power with a portable substation connected directly to the utility line.

- Currently, extensive use of the 244-AR vault is not planned in the future. If a new mission is assigned for 244-AR, motor control centers 1 and 2 may have to be replaced.

- Proposed Project W-280 is to upgrade the lighting in all the Tank Farms. At this time, the project has not been defined well enough to determine the required power. The increased lighting loads could affect the electrical distribution system.

- Project W-030 is to replace the AY and AZ Tank Farms primary exhausters. If this project is canceled or delayed, the generators in the 701-A Building may require that Safety Class 2 requirements be met. The upgrades included in Project W-030 could require two new generators in a new building.

- Interim safety basis and final safety analysis reports have not been completed for Tank Farms. The results of these reports could require upgrades that are not covered by this plan.

- The retrieval schedule for single-shell tanks could affect this plan. The SST farms retrieval schedule may show that some upgrades will not be required because of the short time they would be in use.

6.14.7 SCHEDULE

Refer to Figure 6.14-1.

Figure 6.14-1. Electrical Distribution/Utilities Schedule.

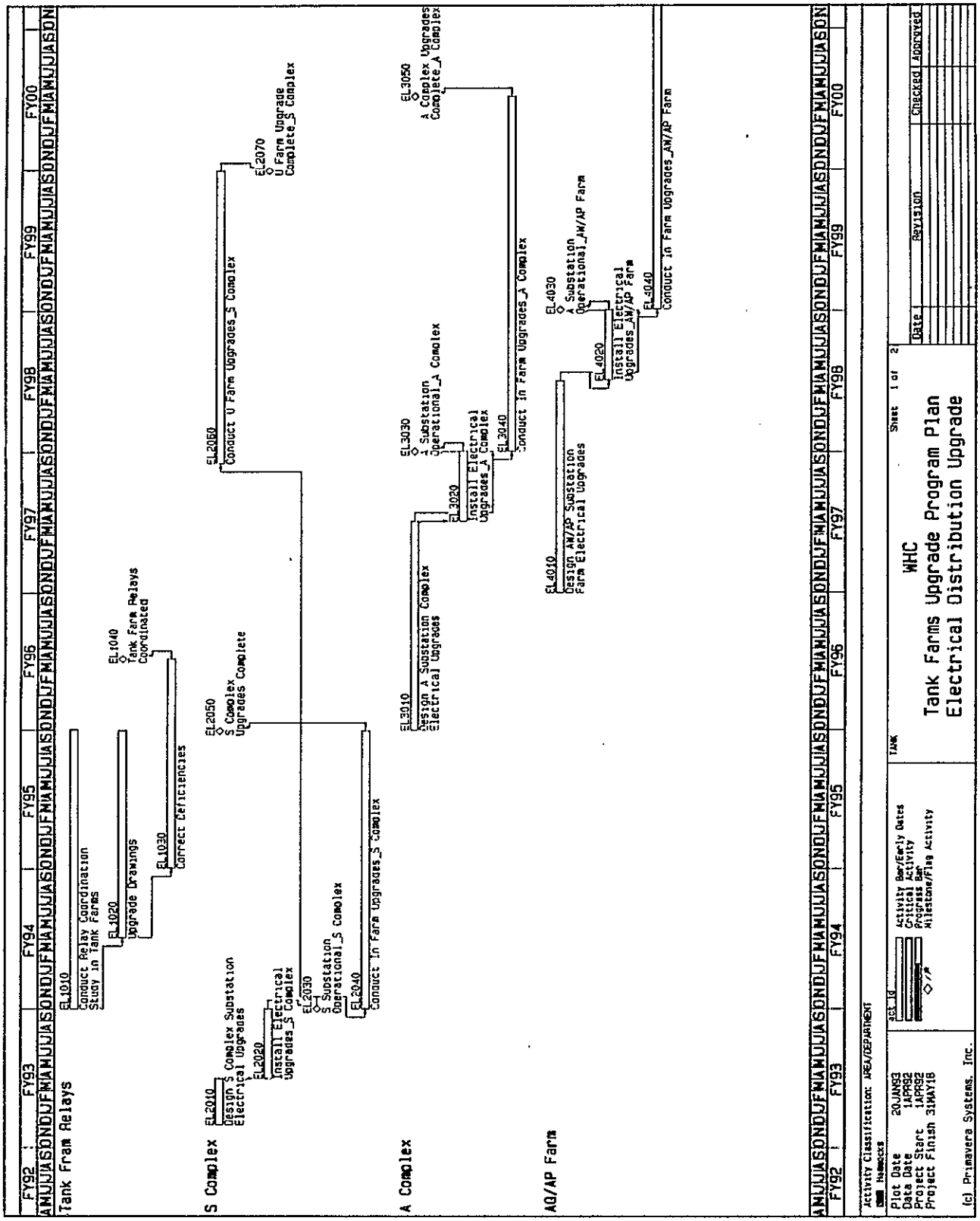
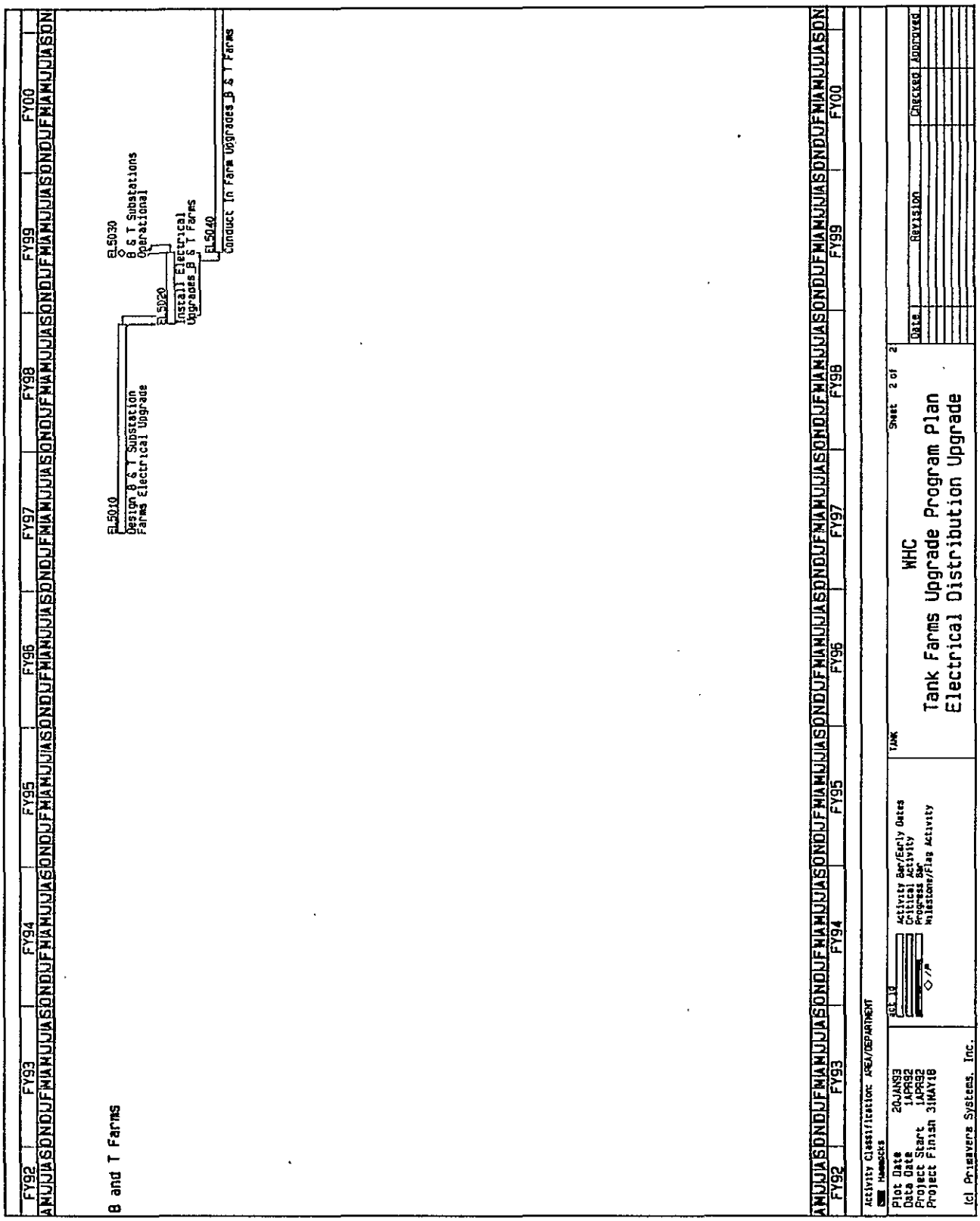


Figure 6.14-1. Electrical Distribution/Utilities Schedule.



6.15 MECHANICAL UTILITIES

6.15.1 GOAL

This plan identifies and describes the necessary upgrades to the mechanical utilities serving double-shell and single-shell tank farms. Each upgrade supports the restoration of the system to an acceptable design basis, the resolution of a safety concern, and/or a requirement of the cleanup mission. Mechanical utilities addressed in this action plan include the compressed air (process air and instrument air), steam supply, water, and emergency cooling systems.

6.15.2 SUMMARY ACTION PLAN

6.15.2.1 Compressed Air. Currently, upgrades to support restoration of the compressed air systems to their design bases are needed at the following facilities, listed in order of priority: 241-A-701, 241-AW-273 (process air compressor), 241-SX-701, 241-CR (dryer only), 241-BX/BY, 241-U-701, 241-B, 242-TX-601, 241-T-701, 2712-B, 244-AR, 241-AN-273, 241-AW-273 (dryer only). The upgrades will consist of replacement of the compressor(s), and, in some cases, replacement of the air dryer and addition of a closed-loop cooling system. Design and procurement are complete for several of the upgrades. System studies must be completed for the remaining systems to ensure that the replacement systems will be designed and to meet the user requirements. The studies will include an evaluation of the existing compressor buildings to determine whether the size and the ventilation systems are adequate for the planned replacement equipment. Where possible, similar designs shall be used for similar functions (i.e., compressed air systems will be standardized), to streamline the design, procurement, and maintenance processes.

A long-term improvement to the compressed air systems will be the design of a trailer-mounted complete backup system that can be adapted for most facilities. The system would include a nonlubricated compressor and an air dryer and would be powered from a welding outlet.

Tank waste disposal projects W-151, 101-AZ Waste Retrieval, and W-211, Initial Tank Retrieval Systems, may require compressed air. Project W-030, Tank Farm Ventilation Upgrades, will completely replace the aging-waste facility ventilation and emergency cooling systems. This upgrade will probably result in a reduction of the 701-A compressed air system Safety Class from 2 to 3. Project W-030 is scheduled for completion by April 15, 1996.

6.15.2.2 Steam. Tank Farms, as well as all other programs in the 200 Areas, recently provided steam-use requirements to the Site planning organization, which in turn provided the information to the Integrated Infrastructure Planning Board. The Board plans to assess the impact to each program if the central steam system is eliminated by 1996. That assessment and the decision of the Board will result in a list of Tank Farm steam system upgrades. Previously identified options include replacing all steam-dependent systems with electric systems, replacing selected steam-dependent systems with electric systems, and improving the operational efficiencies of the existing systems (e.g., repairing leaks). An upgrades plan will be developed, if necessary, following the decision by the Board.

6.15.2.3 Water Systems. Few of the existing raw water meters are calibrated, but a system of calibrated water meters may be needed to monitor the amount of cooling water added to the tanks in some areas. This system upgrade will provide reliable data that can be used in determining effluent generation and tank waste conditions. Raw water is Safety Class 2 for the aging-waste facility because it cools the condensers. This usage, and the raw water discharges from the aging-waste facility, will be reduced or eliminated by Project W-030, Tank Farm Ventilation Upgrades. For the nonaging-waste double-shell tanks and the single-shell tanks, raw water is Safety Class 3.

The backflow preventers in the sanitary and raw water systems are inspected and tested annually and are replaced as needed. Many of the service pits are inside the contamination zones, and the backflow preventers are below grade. This violation of the water codes must be assessed and corrected.

Retrieval of the waste in Tank 241-C-106 will require a raw water supply to the C Tank Farm. The amount of water needed has not been determined.

Project W-252, Phase II Liquid Effluent Program, will provide a common collection and disposal system that will collect the waste streams from various 200 East Area facilities and discharge them to a percolation pond. As part of this effort, closed-loop cooling systems will be installed for the equipment in the facilities served by the collection system. These cooling systems will reduce the water consumption by those facilities. The project is targeted for a 1995 Line Item, with implementation by October 1997.

6.15.2.4 Emergency Cooling. The emergency cooling water system exists only at the aging-waste tank farms (241-AY and 241-AZ). The existing system will be replaced completely with a closed-loop cooling system by Project W-030, Tank Farm Ventilation Upgrades.

6.15.3 JUSTIFICATION

6.15.3.1 Compressed Air. The compressed air system upgrades identified in Section 6.15.2.1 are necessary because of the poor condition of the existing equipment, the inferior quality of the instrument air produced, and the safety and operational functions

provided by the systems. (The 241-A-701 system is Safety Class 2; the others are Safety Class 3 or 4.) The average time to return a Tank Farm compressed air system to service after it has been shut down for repair is several months. Several issues necessitate upgrading the compressed air systems at the earliest practical date:

- Frequent failures
- Inability to obtain spares due to obsolescence
- The resulting long down time
- Noncompliance with current industry standards.

Common problems include oil from lubricated compressors fouling the downstream air dryers and the instruments served by the system; damage to the tank level instruments caused by excess moisture in the air; the generation of wastewater (from once-through cooling systems) that must be monitored, treated, and disposed of; and high maintenance costs caused by worn out components.

Using a standard trailer-mounted backup air system would facilitate upgrades by eliminating the need to design, install, and test a new temporary system to provide air while the permanent system is being replaced. The trailer-mounted system would also increase the margin of safety by providing a readily available source of high-quality air for Safety Class 2 and 3 uses in case of system failure, or as a backup during maintenance.

6.15.3.2 Steam. The steam supply plants in the 200 Area were built in 1943, and the 200 East plant was expanded in 1954. With the exception of one boiler at 200 East, which is now out of service for retubing and rebricking, the plants have not undergone any substantial upgrade. Data compiled by the North American Electrical Reliability Council indicate that boiler reliability degrades after 25 years of operation, and that the average useful life of a steam plant is 40 years without substantial upgrade. The 200 Areas plants are experiencing degradation of reliability due to age and are nearing or have passed the end of their useful life. They require refurbishment or replacement if they are to remain in use.

6.15.3.3 Water Systems. The raw water flowmeters and the backflow preventers must be upgraded to comply with state regulations. The other upgrades identified in Section 6.15.2.3 are needed in support of planned and/or authorized projects.

6.15.3.4 Emergency Cooling. The closed-loop cooling system being installed by Project W-030 will eliminate the cooling water discharges to the soil column, in compliance with U.S. Department of Energy requirements.[1]

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[1]Milliken, E. J., 1989, *Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquid into the Soil Column at the Hanford Site*, WHC-EP-0169-2, Westinghouse Hanford Company, Richland, Washington.

6.15.4 MILESTONES

6.15.4.1 Compressed Air.

- Complete the installation of compressed air system upgrades at 241-AW-273, 241-SX-701, 241-U-701, 241-T-701, and 241-CR. Funding: Major Maintenance Upgrades, fiscal year (FY) 1993. Responsibility: Facilities & Equipment Engineering, Upgrades Technical Support, Major Maintenance. Scheduled completion date: September 30, 1993

- Complete the user requirement studies, the design, and the installation of the compressed air system upgrades at 241-A-701, 241-BY/BX, 241-B, 242-TX-601, 2712-B, 244-AR, 241-AN, and 241-AW. Funding: Major Maintenance Upgrades through end of FY 1993; completion dependent on FY 1994 and FY 1995 funding. Responsibility: Facilities & Equipment Engineering, Upgrades Technical Support, Major Maintenance. Scheduled completion date: September 30, 1995

- Design, procure, install, and test a portable backup compressed air system that would be suitable for use in case of system failure at most locations. Funding: Not identified; dependent on FY 1994 funding. Responsibility: Facilities & Equipment Engineering. Scheduled completion date: January 31, 1995

6.15.4.2 Steam.

- Complete an assessment of the impact of discontinuing Tank Farm dependence on the 200 Areas Central Steam System. Funding: Site Planning, Integrated Infrastructure Planning. Responsibility: TBD. Scheduled completion date: TBD.

6.15.4.3 Water Systems.

- Assess the conditions of the backflow preventers. Determine the need for and scope of system upgrades. Funding: Not identified; dependent on FY 1994 funding. Responsibility: Facilities & Equipment Engineering. Scheduled completion date: May 12, 1994

6.15.4.4 Emergency Cooling.

- No activities will be performed for this system. The system will be eliminated by Project W-030, Tank Farm Ventilation Upgrades.

6.15.5 TIE-INS

Instrumentation:

- Replacing the Food Instrument Corporation tank level gauges, which use instrument air, with another kind of level indicator that does not require air would reduce or eliminate the need for compressed air at some of the facilities listed above. This change would shorten the list of required compressed air system upgrades and change the order of priority of the remaining upgrades.

Facilities:

- The compressor building at 241-BX/BY is in a contaminated zone, making maintenance and daily monitoring difficult and time consuming. When that compressor is replaced, it should be located in a different building that is not in a contaminated area.

- The buildings that house compressors must be evaluated to determine if upgrades to the ventilation systems or enlargement of the buildings to accommodate larger compressors is required. The evaluation should be part of the user requirements assessment.

- New office buildings, operations facilities, and shops will require water and possibly other mechanical utility supplies.

Electrical Utilities:

- Upgrades to the compressed air system, such as the addition of closed-loop cooling systems and the use of higher or lower capacity compressors in some areas may affect the electrical power loads.

- Changes to the current safety classifications of some compressed air systems may result in changes to the need for emergency backup power generators.

- Implementing the proposed conversion of some steam-dependent systems to electrical systems will affect the electrical utilities.

Ventilation:

- Project W-030, Tank Farm Ventilation Upgrades, will eliminate the emergency cooling system.

6.15.6 CONTINGENCIES

- The current compressed air system upgrade plan does not consider future needs to support the cleanup mission.

- The volume of raw water needed to support retrieval of the waste from Tank 241-C-106 has not been determined, but the information will be available in December 1992. The task is not expected to affect compressed air or steam requirements.

- Project W-211, Initial Tank Retrieval Systems, may increase the compressed air, steam, and water needs for all the DST Farms. The functional design criteria for the project will provide an estimate of the project's impact on the utilities. The preliminary estimates show that the existing capacities of mechanical utilities will meet the needs of the project; however, some of the compressed air system upgrades will affect the capacities and may not provide enough air for the project.

- The 200 Areas Steam Assessment Workshop was held on October 15, 1992, to determine each program's short-term and long-term steam needs and to develop a plan for meeting those needs. On October 28, the results of the meeting were given to the Integrated Infrastructure Planning Board. The Board plans to ask each program to assess the impact of becoming independent of the 200 Areas central steam system by 1996. If the Board decides to eliminate the central steam system, the changes identified in the impact assessment will have to be implemented.

6.15.7 SCHEDULE

Refer to Figure 6.15-1.

Figure 6.15-1. Mechanical Utilities Schedule.

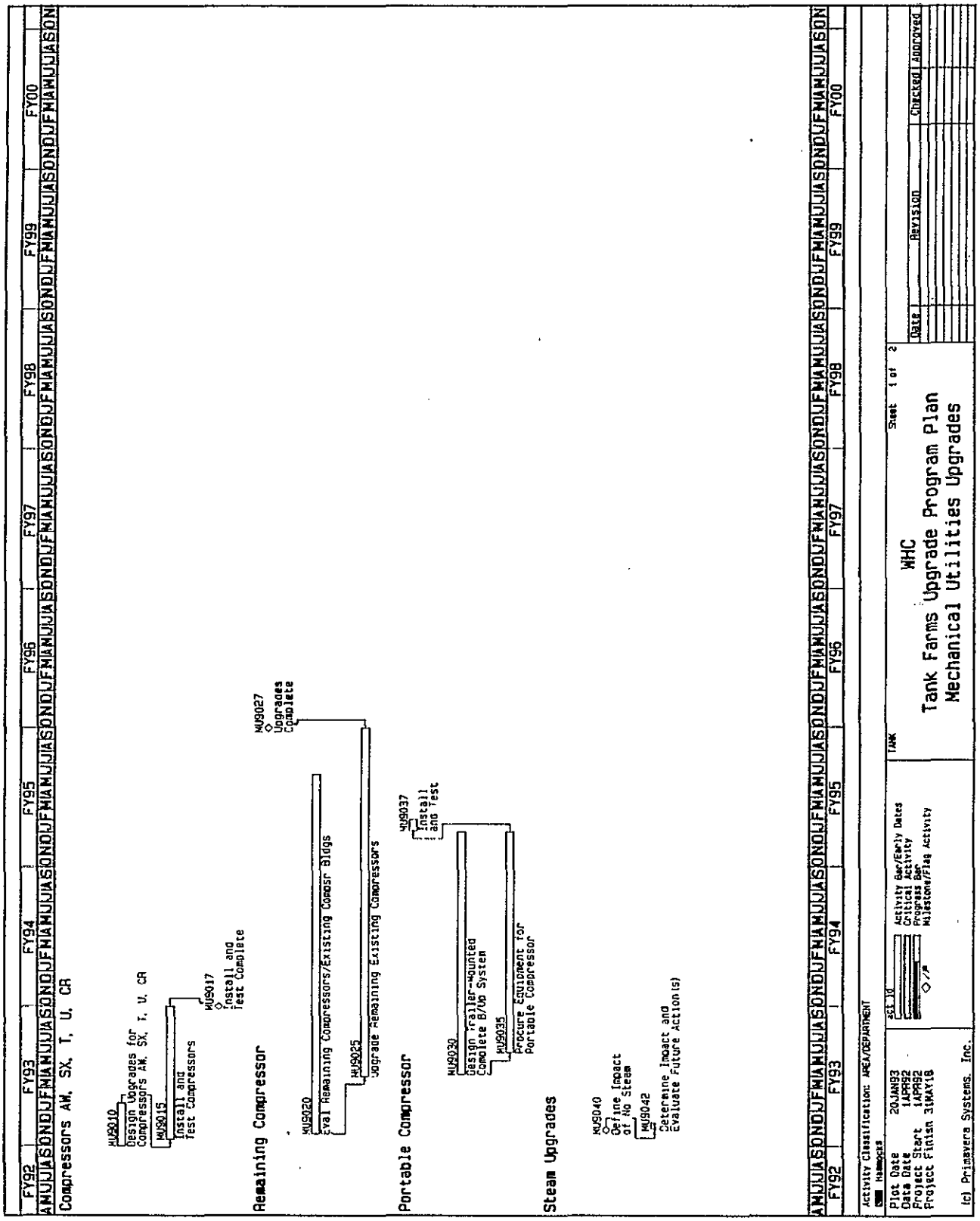
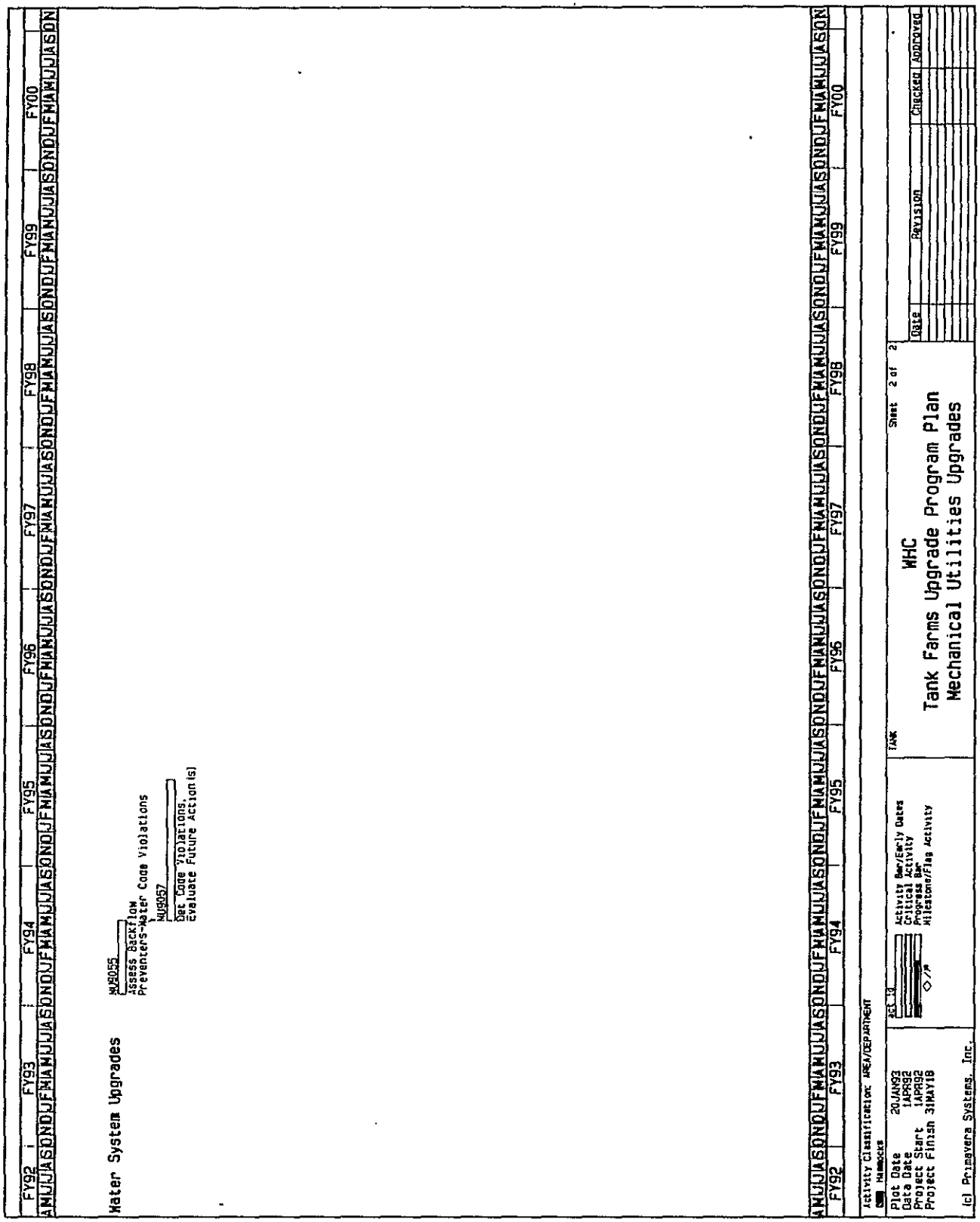


Figure 6.15-1. Mechanical Utilities Schedule.



6.16 WASTE TRANSFER

6.16.1 GOAL

This action plan identifies and describes the upgrades necessary for the restoration of Tank Farm waste transfer systems to acceptable design bases. In addition, waste transfer upgrades required for resolution of safety concerns, continued operation within safety envelope, and the retrieval and cleanup mission are discussed.

6.16.2 SUMMARY ACTION PLAN

Cross-Site Transfer System (Project W-058)--The cross-site transfer system connects the 200 West Area double-shell tanks (DST) with the 200 East Area DST and the 242-A Evaporator (through 102-AW). The existing transfer line does not meet operational needs or regulatory requirements for future cross-site transfers. Project W-058 will connect the 241-SY-A and 241-SY-B valve boxes in the 200 West Area with the 244-AR double-contained receiving tank (DCRT) in the 200 East Area with a new compliant transfer line.

Waste Transfer System (Project W-201)

This project provides two transfer lines and diversion boxes in the 200 West area and two transfer lines and diversion boxes in the 200 East area. The two lines in the 200 West area will be connected to the cross-site transfer line at 241-SY Tank Farm. One of the lines will extend north and terminate at a location south of T Plant. The other line will be routed south and terminated near the 241-SX Tank Farm. The 200 East area transfer lines are connected to the cross-site transfer lines. One of the lines runs north and terminates near the B Complex tank farms. The other line will allow access to the 241-C Tank Farm and the A Complex tank farms.

T Plant--Most waste cleanup activities around the Site will involve equipment decontamination. If T Plant is upgraded, most of the decontamination work could be performed there. All of the waste transfer lines are noncompliant and would have to be replaced.

Plutonium Finishing Plant--A backlog of plutonium nitrate may need to be processed. Currently, there are two campaigns to process the material: stabilization and scrap processing. The transfer lines [Plutonium Finishing Plant (PFP) to 244-TX DCRT], which will be required for these processes, are probably *Resource Conservation and Recovery Act*

of 1976[1] (RCRA) compliant. However, the transfer lines from the DCRT to the S-151 diversion box, as well as the line leaving S-151, use a concrete raceway for secondary containment and therefore are not in compliance with RCRA requirements.

Single-Shell Tanks--Waste transfer from single-shell tanks (SSTs) to DSTs will be required for the stabilization, retrieval, and closure efforts. Existing transfer lines are direct-buried pipe without secondary containment; however, any future transfer lines constructed will have to be RCRA compliant. As a result, new transfer lines will have to be added to support waste transfer.

Tank 241-C-106 Retrieval (Project W-139)--This Watchlist tank generates high heat from the decay of ^{90}Sr. Water is added to the tank to control the temperature within allowable limits. The heat is removed by the ventilation system via evaporation of the added water and conduction to the surrounding soil. Heat transfer analysis indicates that water additions may be terminated safely when the heat generation rate decreases to approximately 10,000 Kcal/hr by the year 2045. At that time, the tank will be 100 years old and well past its design life. Waste retrieval is the only long-term solution to the high heat problem. To support retrieval, a new waste transfer system must be constructed from the SST to one of the aging-waste tank farms. Waste retrieval is the only long-term solution to the high heat problem.

Aging-Waste Transfer Lines (Project W-028)--This project provides a waste transfer system from the aging-waste facilities (241-AY and 241-AZ) to the Hanford Waste Vitrification Plant (HWVP) and the Multifunction Waste Tank Facility (MWTF). In addition, it provides RCRA-compliant waste lines for B Plant. The waste transfer system to support pretreatment operations will consist of double-containment pipelines, valves, and a diversion box to connect 151-AR diversion box and existing high-level mixed-waste tank farms.

Spare Transfer Pump Storage and Test Pit Upgrades--The existing horizontal racks at 273-EA, used to store the vertical turbine pumps between shop testing and installation, have been analyzed and were declared unsafe to support their design loads. Replacement storage racks have been designed and must be built. Funding has not been identified for construction of the new racks. The estimated cost of the new racks is $200,000.

The pump testing pit at the 200 East Area requires upgraded instrumentation and additional electrical capacity to support testing of the new pumps needed for the grout program, hydrogen mitigation, and waste retrieval. In addition, the instrumentation should be upgraded to provide better monitoring of the pumps during testing and to shut off the pumps when certain parameters are exceeded. A preliminary study has identified the upgrades needed to support the retrieval program. An integrated study must be performed to identify the needs of all the potential users and to develop a plan for funding the upgrades. If possible, the cost of the upgrades should be divided among the users.

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[1]*Resource Conservation and Recovery Act of 1976*, 42 U.S.C. 6901 et seq.

6.16.3 JUSTIFICATION

Cross-Site Transfer System (Project W-058)--Unless this project is implemented, future transfers required for waste retrieval and final waste disposal will not be possible. A detailed discussion of the justification is contained in the functional design criteria (FDC) for this project.[2]

Waste Transfer System (Project W-201)--Unless this project is implemented, future transfers required for waste retrieval and final waste disposal may not be possible. At this time, the justification is incomplete. Additional studies and documentation will be provided during project definition. Continued support of this project will depend on the results of this study, estimated cost, and schedule.

Tank 241-C-106 Retrieval (Project W-139)--Retrieval of the waste is a *Hanford Federal Facility Agreement and Consent Order*[3] (Tri-Party Agreement) milestone (M-05-08, September 1996). Transfer of the waste from this tank will eliminate the high-heat safety concern.

Aging-Waste Transfer Lines (Project W-028)--Currently, two pipelines provide high-level mixed-waste transfer capabilities between tank farms and B Plant. Each line is single directional; therefore, one does not provide backup for the other. These 32-year-old pipelines are the last schedule 10 (thin wall) concrete-encased pipelines that support high-level mixed-waste transfer. Experience with similar pipelines indicates that future operation cannot be supported without a high probability of failure. In addition, these pipelines do not comply with RCRA requirements.

An upgraded transfer system to interface with pretreatment and tank farms is required to support high-level mixed-waste pretreatment operations at HWVP.

Spare Transfer Pump Storage and Test Pit Upgrades--The condition of the existing storage racks has been identified as a safety issue on several different lists dating back to 1988. No additional pumps can be put on the racks, and the area around the racks has been roped off. Pumps that have been tested are being stored on cross-ties on a concrete pad, which is running out of room. If the new racks are not provided, new pumps will have to be stored on a gravel area that is not level and will stress the pump shafts.

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[2]Reep, I.E., 1992, *Functional Design Criteria for Replacement of Cross-Site Transfer System*, WHC-SD-W058-FDC-001, Rev. 0A, Westinghouse Hanford Company, Richland, Washington.

[3]Ecology, EPA, and DOE, 1990, *Hanford Federal Facility Agreement and Consent Order*, 2 Vols, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

The existing test pit does not have the necessary instrumentation, structural integrity, or electrical capacity to test the new pumps that are needed for future programs. The retrieval program has identified the changes that are needed to support testing of their mixer pumps, and the upgrades could be designed to also benefit the grout program, hydrogen mitigation, and current uses of the facility.

6.16.4 MILESTONES

Cross-Site Transfer System (Project W-058)

- Began engineering study, FDC, and conceptual design report in October 1990 and completed in March 1991
- Began *National Environmental Policy Act of 1969*[4] (NEPA) permitting and safety documentation in January 1991; it will be completed by March 1996
- Began design and construction in January 1992; it will be completed by March 1996
- Begin startup testing in November 1994 and complete by September 1996

Waste Transfer System (Project W-201)

- Began engineering study, FDC, and conceptual design report in December 1992; it will be completed by March 1994
- Begin NEPA permitting and safety documentation in May 1993 and complete by December 2001
- Begin design and construction in January 1996 and complete by December 2001
- Begin startup testing in June 1997 and complete by July 2002

Tank 241-C-106 Retrieval (Project W-139)

- Began engineering study, FDC, and conceptual design report in February 1991 and completed in March 1992
- Began NEPA permitting and safety documentation in May 1991; it will be complete May 1995

[4]*National Environmental Policy Act of 1969*, 42 U.S.C. 4321 et seq.

- Began design and construction in March 1992; it will be complete by September 1997
- Begin startup testing December 1995 and complete by November 1998

Aging-Waste Transfer Lines (Project W-028)

- Begin definitive design in February 1993 and complete by April 1995
- Begin procurement in June 1993 and complete by June 1995
- Begin construction in April 1995 and complete by December 1996

Spare Transfer Pump Storage and Test Pit Upgrades

- Begin new pump storage racks in April 1993
- Develop Scope/Funding Plan for Pump Test Pit Upgrades in October 1994

6.16.5 TIE-INS

The transfer lines upgrades are partially dependent upon the needs of waste retrieval. The method employed to retrieve the waste and sequencing of tank farms may affect the priority of the planned upgrades. The retrieval method has not been finalized, but the schedule is expected to be issued by March 1993.

- Resizing or the addition of waste transfer pumps may affect the existing electrical utilities.

6.16.6 CONTINGENCIES

Existing transfer lines that are direct-buried or in concrete raceways may continue to be used based on pressurization tests if the upgrades to pipe-in-pipe encasements are not performed and the necessary exemptions from requirements are approved.

6.16.7 SCHEDULE

Refer to Figure 6.16-1.

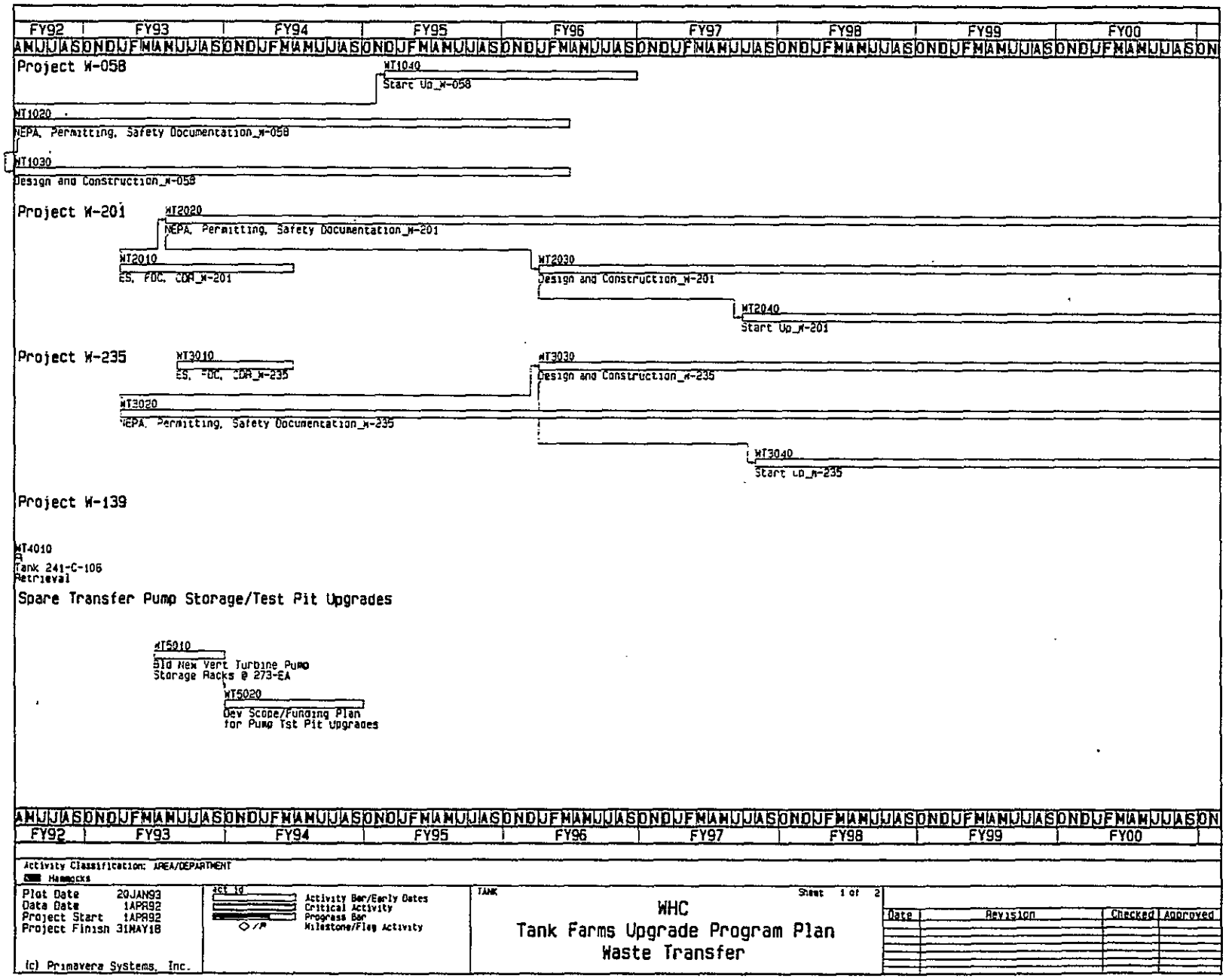


Figure 6.16-1. Waste Transfer Schedule.

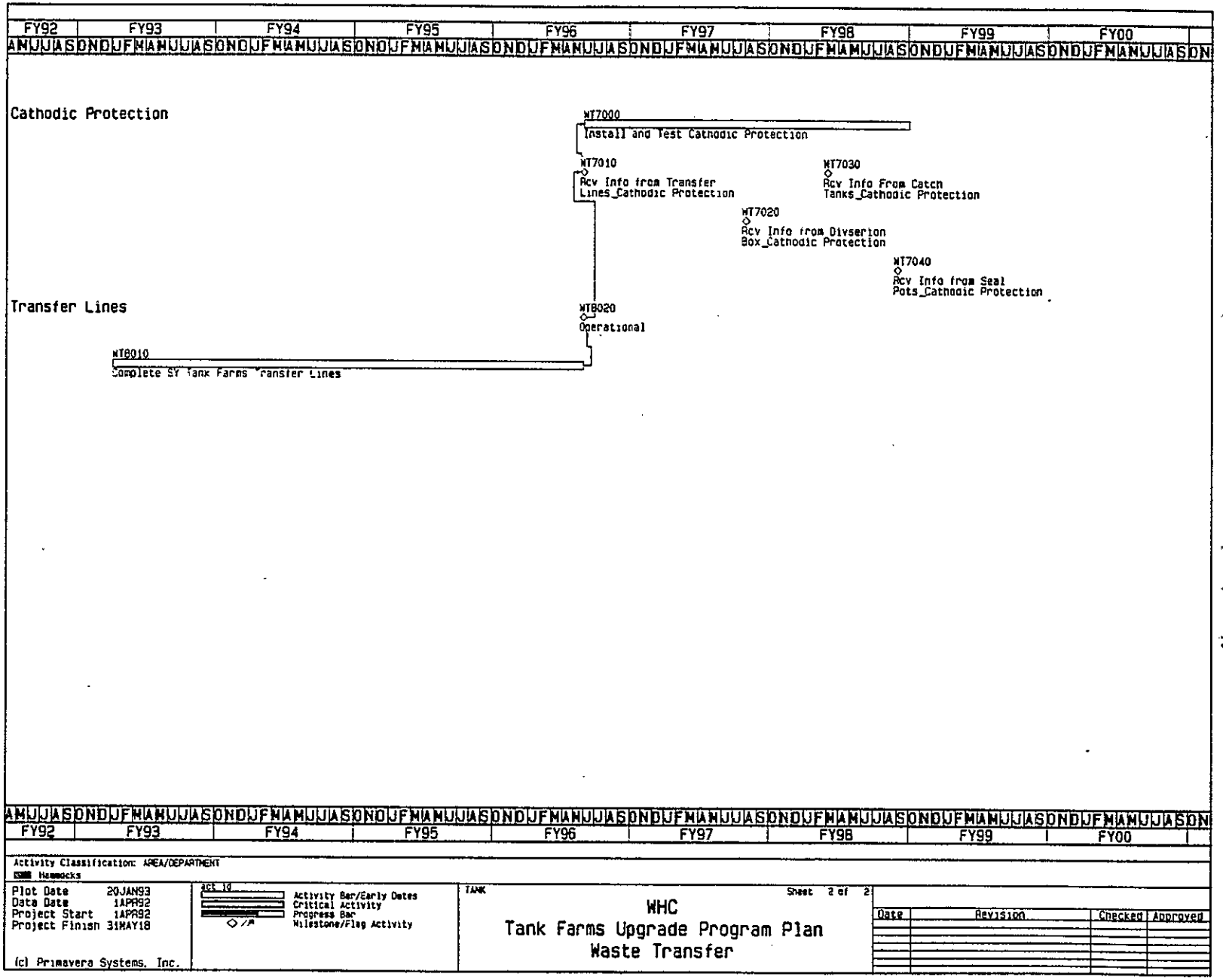


Figure 6.16-1. Waste Transfer Schedule.

6.17 FIRE PROTECTION

6.17.1 GOAL

This action plan discusses the upgrades needed for the Tank Farms fire protection system to comply with the required codes and standards. The fire protection system includes the water mains, hydrants, and signalling devices, such as smoke detectors and alarm pull boxes.

6.17.2 SUMMARY ACTION PLAN

The fire protection system is the responsibility of Fire Protection Engineering. In addition, the testing and maintenance of the smoke detectors, alarm pull boxes, and other signalling devices are the responsibility of the Hanford Fire Department, Testing and Services group. Tank Farms does not work on these systems, but this section is included to provide a complete picture of the Tank Farms.

The present fire protection system in the 200 Areas is being upgraded. These upgrades include the pumps at the river, the main line to the 200 Areas, and new laterals inside each area; these three projects are described below:

- L-005 upgraded the sanitary and raw water systems in the 200 East Area to comply with the National Fire Protection Agency (NFPA) and U.S. Department of Energy (DOE) requirements. A major part of the project work was to add a lateral line to create a loop from two deadend lines. This new line provides a second source of water by the A Complex and C Tank Farm. Also, this project provides a 10 in. raw water connection for Project C-018, the evaporator upgrade. A section of line by B Plant was eliminated from the project because of high surface contamination. The project was completed in December, 1992.

- L-007 provided cross-tie and lateral piping in the 200 West Area for two directional sources of sanitary and raw water. This project is similar to Project L-005 above, but it is for the 200 West Area. The main areas affected by this upgrade were by S and U Plants. This project is completed.

- B-604 upgrades the water delivery system to ensure that it will be capable of supplying fire and process water needs during a design-basis fire scenario. This project will probably include a second raw water line to the 200 West Area and a new sanitary water reservoir in the 200 East Area. The project

schedule calls for completing advanced conceptual design in April 1993, with construction to start in 1994; it will be completed in late 1996.

Current signalling devices are adequate. Any upgrades required when a facility is remodeled or added would be handled by that project.

6.17.3 JUSTIFICATION

The fire protection system was adequate when it was first installed, but requirements have changed; in addition, protected facilities are being added or their missions are being changed. The fire protection system must be upgraded to match these changes.

6.17.4 TIE-INS

Upgrades to the fire protection system are the responsibility of Fire Protection Engineering. If these upgrades are delayed, the impact on other Tank Farm projects would be minimal because the fire protection system is a stand-alone system that uses minimal tank farm power, has no direct tie-ins to other Tank Farm systems, and is only required in emergencies.

6.17.5 CONTINGENCIES

- Currently, a Fire Hazards Analysis (FHA) has been completed only for the double-shell tanks and 204-AR Vault. There were no major findings that would affect the Tank Farms upgrades program; however, additional FHAs for the remaining facilities could have major impacts.

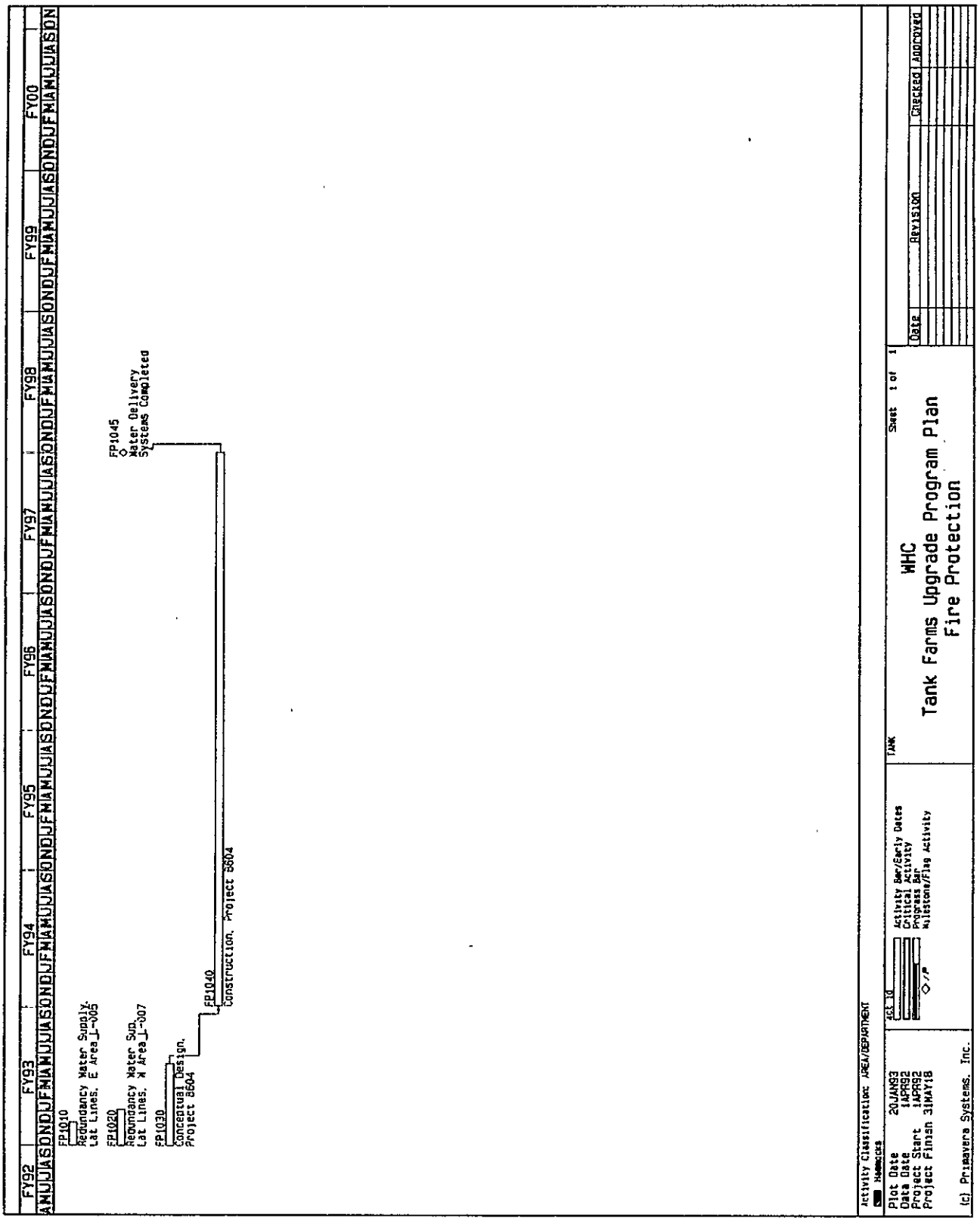
- The fire safety issues of the ferrocyanide- and hydrogen-generating tanks are yet to be defined. The resolution of these issues may require modification of the fire protection system or more monitoring equipment installed in the tank farms. Monitoring equipment, such as the hydrogen monitoring system at Tank 241-SY-101, could be Tank Farm's responsibility and could affect the instrument upgrades plan.

- The fire protection program for DOE is based partly on the replacement value of the structure. A tank farm does not closely match any of the structure definitions, so the classification of a tank farm is based on the buildings in the farm, typically the instrument building. If DOE's assessment method were to change, the level of protection required in each tank farm could increase, requiring changes to the fire protection system.

6.17.6 SCHEDULE

Refer to Figure 6.17-1.

Figure 6.17-1. Fire Protection Schedule.



6.18 CONTAMINATION ZONE REDUCTION/ALARA

6.18.1 GOAL

The goal of the upgrades planned for the contamination zone reduction/as low as reasonably achievable (ALARA) concerns for the Hanford Site Tank Farms is to mitigate or terminate the migration of radioactive materials from the regulated Tank Farm areas. These efforts will assist in the elimination, reduction, or control of risk to human health and the environment associated with this contamination.

6.18.2 SUMMARY ACTION PLAN

This plan lays out an aggressive two-pronged attack: Apply a semipermanent fixative (to be reapplied every three years in high traffic locations) to selected tank farm areas to halt the migration of surface contamination, and initiate permanent cleanup/fixation operations while the contamination is interim-stabilized.

The plan features three activities that will effect an immediate major reduction of the tank farm surface contamination hazard in fiscal year (FY) 1993:

- Surface-seal all tank farms, except 241-AP, 241-AW, 241-SY, 241-T, 241-TX, and 241-TY, with Enduroseal-200[1], a non-hazardous pine-pitch-based road sealer that will fix surface contamination and prevent migration for the next several years.

- Survey 241-AW, 241-SY, 241-T, 241-TX, and 241-TY Tank Farms using a new shielded multiprobe survey instrument package. Release the tank farms to Radiologically Controlled Area (RCA) status. (241-AP Tank Farm has already been declared clean and requires no further action.)

- Interim-stabilize the A-40 Retention Basin, one of the worst sources of spreading surface contamination at the Hanford Site. The ruptured hypalon bladders will be shoved into one end of the trench. The trench will then be backfilled with contaminated soil from the 244-A/A-40 surface contamination area and topped with clean backfill.

Continued funding in FY 1994 will lead to remediation of the cross-site pipeline surface contamination area, a significant project because of its large contaminated area

[1]Enduroseal-200 is a registered trademark of Future Way Enviro Technologies Inc.

(nearly 1 million square feet), as well as the stabilization of other smaller tank farm facilities. Funding in subsequent years will also be required to complete contamination stabilization and to maintain the progress that has been made.

In conjunction with the large cleanup tasks identified in this action plan, it is essential that the tank farm facilities greatly increase efforts to eliminate recontamination sources, such as leaking riser flanges and open manual tapes, and to remove the worst areas of spot contamination.

6.18.3 JUSTIFICATION

The surface areas of the Tank Farms and related areas have become contaminated with radioactive material during the course of more than 40 years of operation. Radioactive material from some of these areas continues to migrate beyond the boundaries of established and regulated areas into clean, uncontrolled areas. Survey reports indicate that surface contamination levels from 0.15 to 1.5 mrad/hour are not uncommon in uncontrolled areas as the result of blowing sand, tumbleweeds, vegetation fragments, and animal droppings originating in the Tank Farm facilities. Some areas have speck contamination ranging from a few mrad/hour to 1 rad/hour. This contamination presents a health threat to persons working in uncontrolled areas and also poses a risk on a smaller scale to people working under more controlled conditions in the tank farms themselves. Cleanup of the contamination will not only greatly improve the safety of tank farm areas, but will effect a major reduction in costs for protective equipment and in doing work in the field.

6.18.4 MILESTONES

Short-term plans (FY 1993):

- Surface-seal all tank farms except AP, AW, SY, T, TX, and TY. Scheduled Completion Date: September 1993.
- Survey and release AW, SY, T, TX, TY Tank Farms to radiological controls. Scheduled Completion Date: September 1993.
- Interim-stabilize the 216-A-40 Retention Basin and the A-40/244-A surface contamination area. Scheduled Completion Date: September 1993.

Long-term plans (Post-FY 1993):

- Collect and stabilize the contaminated soil in the vicinity of the cross-site transfer line and remove the area from surface-contamination status. Scheduled Completion Date: September 1994.

- Remove light surface contamination where possible from the 241-B, 241-BX, 241-BY, and 241-C Tank Farms, and the CR Vault. Apply asphalt or shotcrete to permanently seal areas in those facilities that cannot be decontaminated. Scheduled Completion Date: September 1995.

- Remove spot contamination from areas outside the tank farm boundaries and release the areas to RCA status where possible. Apply Enduroseal-200 to areas where decontamination and/or release is not feasible. Scheduled Completion Date: September 1995.

- Remove light surface contamination where possible from the 241-S, 241-SX, and 241-U Tank Farms. Apply asphalt or shotcrete to permanently seal areas in those facilities that cannot be decontaminated. Scheduled Completion Date: September 1996.

- Evaluate performance of Enduroseal-200 and reapply where necessary. Scheduled Completion Date: September 1996.

- Remove light surface contamination where possible from the 241-A, 241-AN, 241-AX, 241-AY, and 241-AZ Tank Farms. Apply asphalt or shotcrete to permanently seal areas in those facilities that cannot be decontaminated. Scheduled Completion Date: September 1997.

- Remove light surface contamination where possible from 244-AR, 242-B, 242-T, the basins, and the cribs. Apply asphalt or shotcrete to permanently seal areas in those facilities that cannot be decontaminated. Scheduled Completion Date: September 1997.

- Evaluate performance of Enduroseal-200 (if any treated, non-stabilized areas remain), and reapply where necessary. Scheduled Completion Date: September 1999.

6.18.5 TIE-INS

- The Retrieval effort is affected by the activities described in this action plan in that accessibility to the tank farms will greatly improve the work process.

6.18.6 CONTINGENCIES

- Inadequate resources (staff allocation, financial, or equipment) will affect the efforts discussed in this action plan.

- Tank Waste Remediation System may be requested to fund additional cleanup activities of areas affected by contamination drift from the tank farms.

6.18.7 SCHEDULE

Refer to Figure 6.18-1.

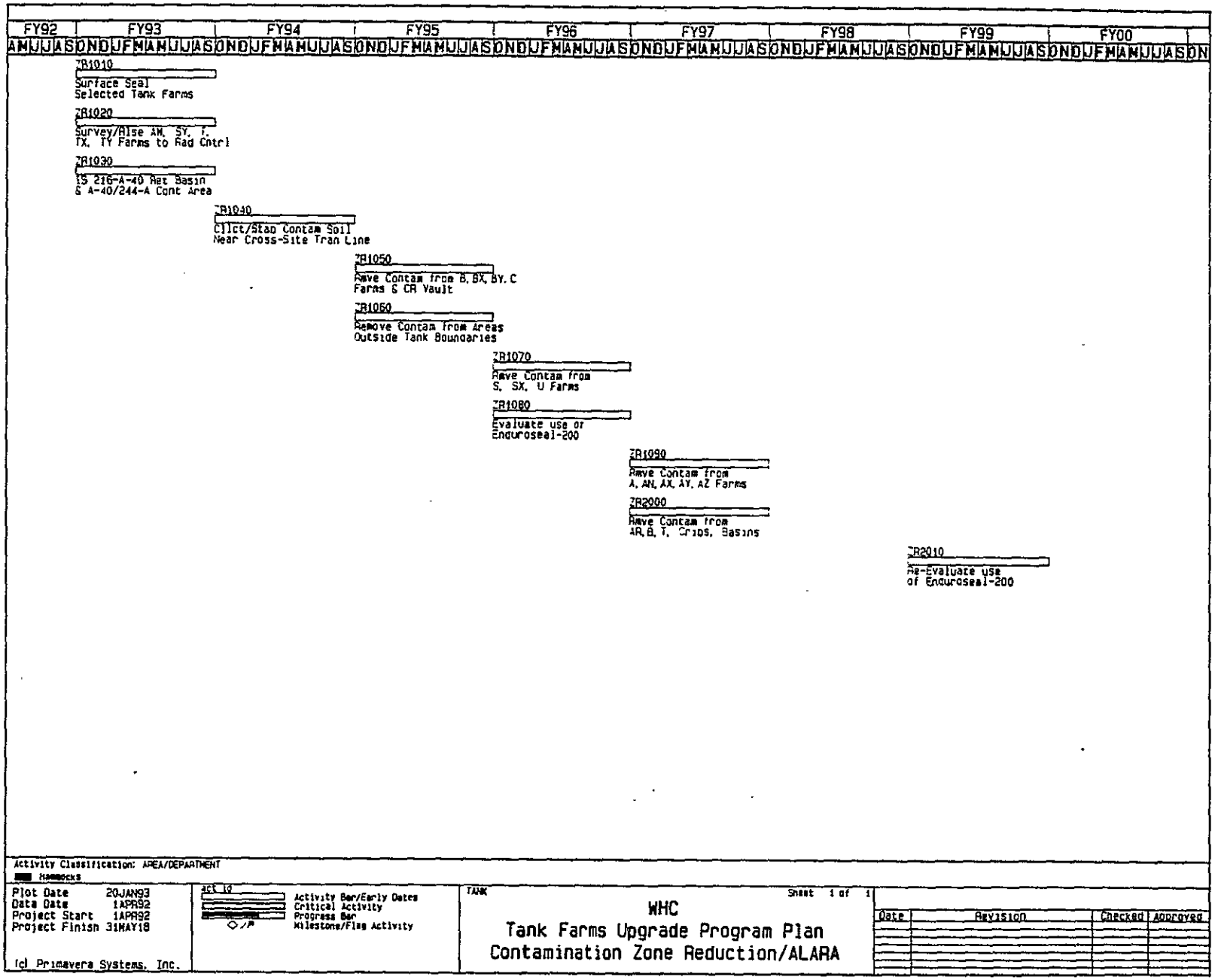


Figure 6.18-1. Contamination Zone/ALARA Schedule.

APPENDIX A

TANK FARM VISION AND MISSION

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APPENDIX A
TANK FARM VISION AND MISSION

Figure A-1 shows the Tank Waste Remediation System (TWRS) Statement of Vision, the Vision, and the TWRS Program Mission. The statements were agreed to by representatives of Westinghouse Hanford Company, Pacific Northwest Laboratory, U.S. Department of Energy, Richland Field Office, and the U.S. Department of Energy in November 1992.

Figures A-2 through A-7 show the TWRS Program Mission, five Mission Products, the Goals that support each Mission Product, and the Objectives that support each Goal; these figures were issued in December 1992 by the TWRS Program Control organization. The elements of the chart were developed concurrently with the development of the *Tank Farms Restoration and Upgrades Program Plan* (the Plan).

Following the chart is a description of how each Objective is supported by the Plan. The Objectives that are not directly supported by the Plan are marked "NA" because most of those Objectives are outside the scope of Work Breakdown Structure element 1N3.

Figure A-1. Signed TWRS Vision and Mission Statement.

TWRS Baseline Development

Statement of Vision

The mission of the Tank Waste Remediation System (TWRS) is to store, treat, and immobilize highly radioactive Hanford Site tank waste in an environmentally sound, safe, and cost-effective manner. Our vision as the TWRS team is that we will manage, address, and remedy the safety and environmental hazards associated with the waste. Through scientific, engineering, and business excellence, we will develop the people and prove the technologies that can successfully meet the objectives of our mission.We will make our lessons learned and technologies available so that others may benefit from the TWRS experience. Our activities will support the goals of the Hanford environmental restoration mission, and through our achievements, we will make as much of the Hanford Site as possible safe, clean, and available for unrestricted future use.

The Vision-

The TWRS team will...

- Accomplish the TWRS mission to store, treat, and immobilize highly radioactive Hanford Site tank waste in an environmentally sound, safe, and cost-effective manner.
- Develop our people and prove the technologies to meet the objectives of our mission through scientific, engineering, and business excellence.
- Transfer the lessons learned and technology to benefit others who must deal with hazardous materials.
- Support the goals of the Hanford environmental restoration mission.

TWRS Program Mission

To store, treat and immobilize highly radioactive Hanford waste* in an environmentally sound, safe, and cost effective manner.

* *Current and future tank waste and the Sr/Cs Capsules*

Harry D. Harmon — H.D. Harmon WHC

J.D. Spencer — J.D. Spencer PNL

J.H. Anttonen — J.H. Anttonen DOE RL

J.C. Tseng — J.C. Tseng DOE HQ

11/19/92

Figure A-2. TWRS Mission, Goals, and Objectives.

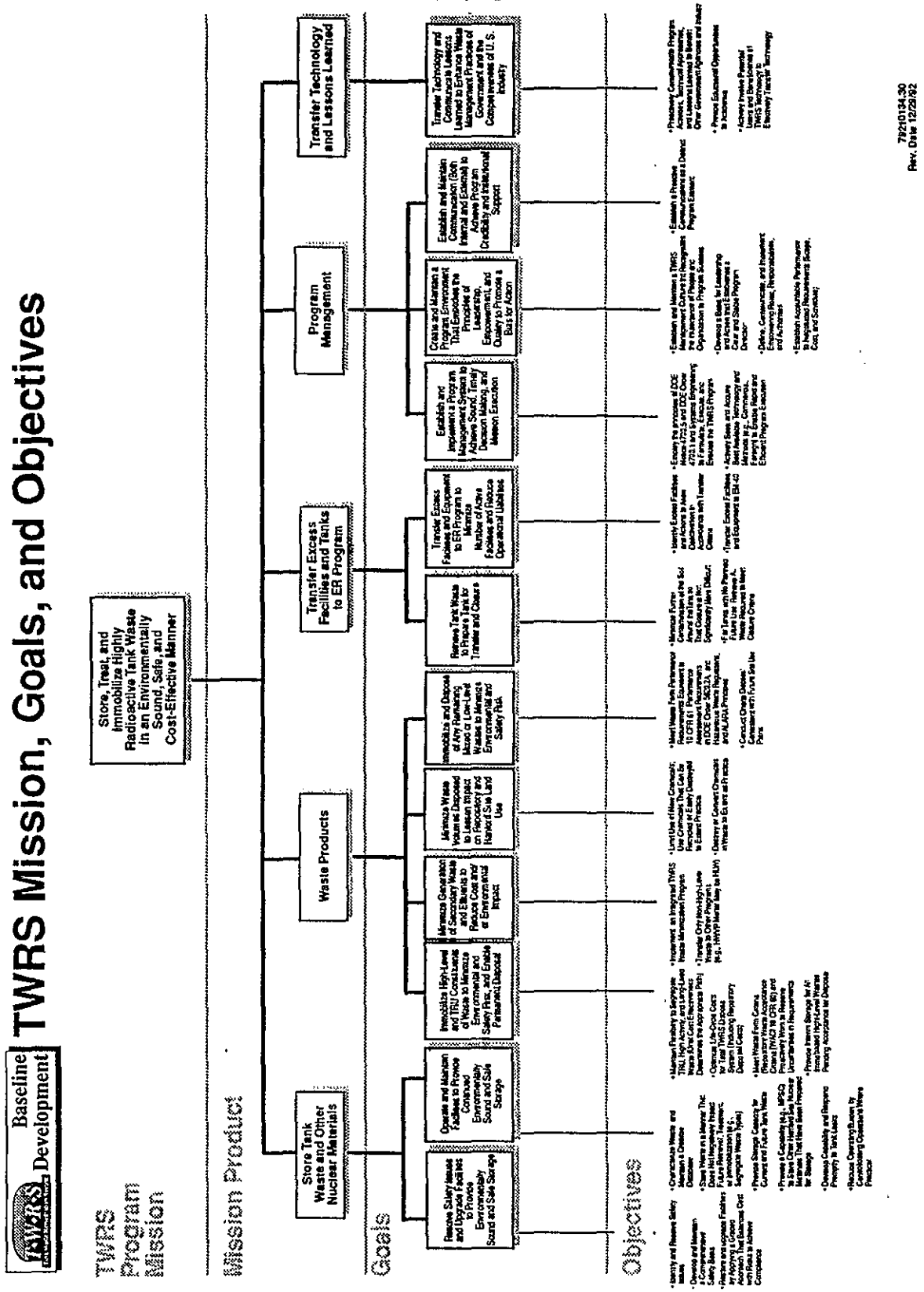


Figure A-3. TWRS Mission Products, Store Waste and Other Materials.

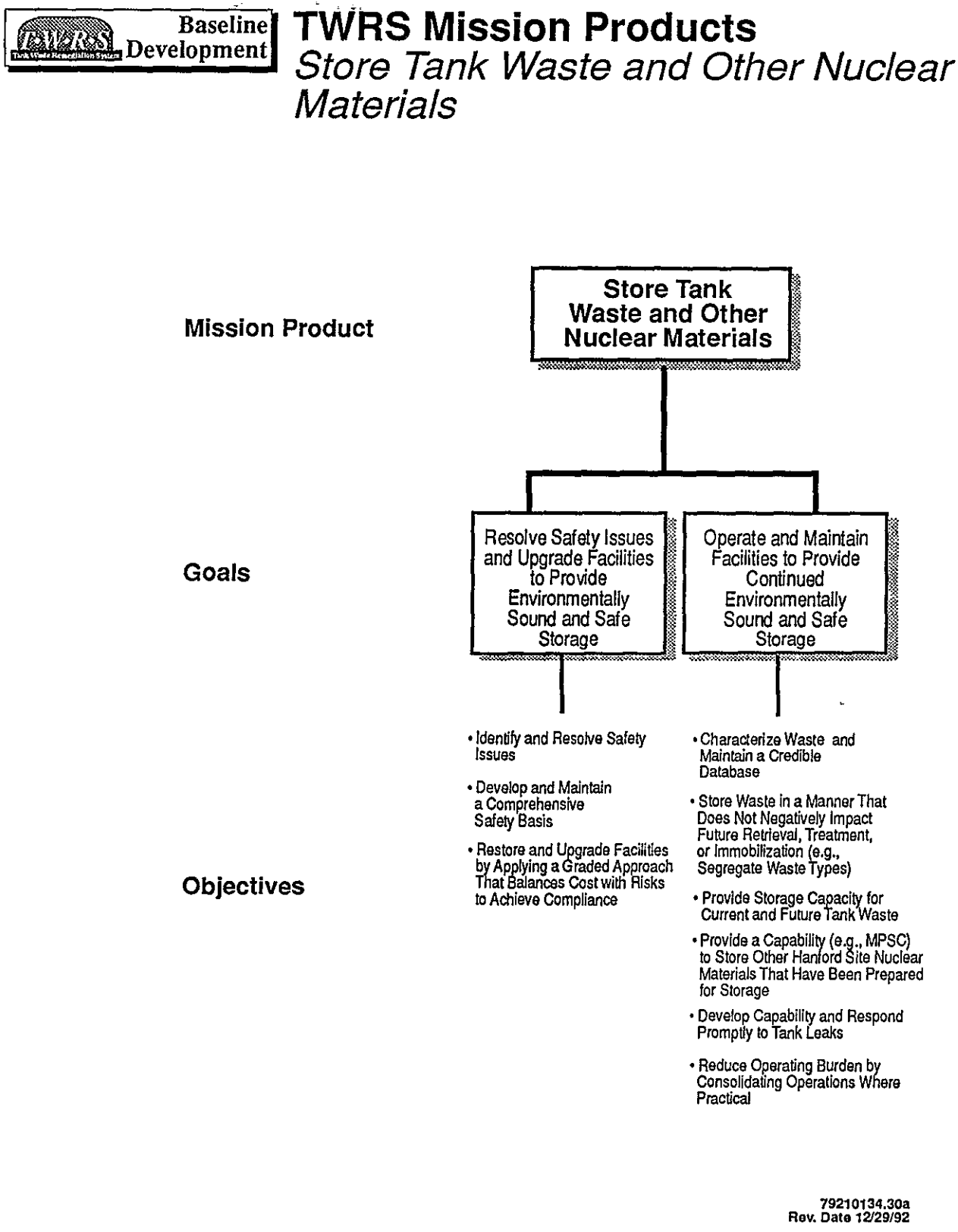


Figure A-4. TWRS Mission Products, Waste Products.

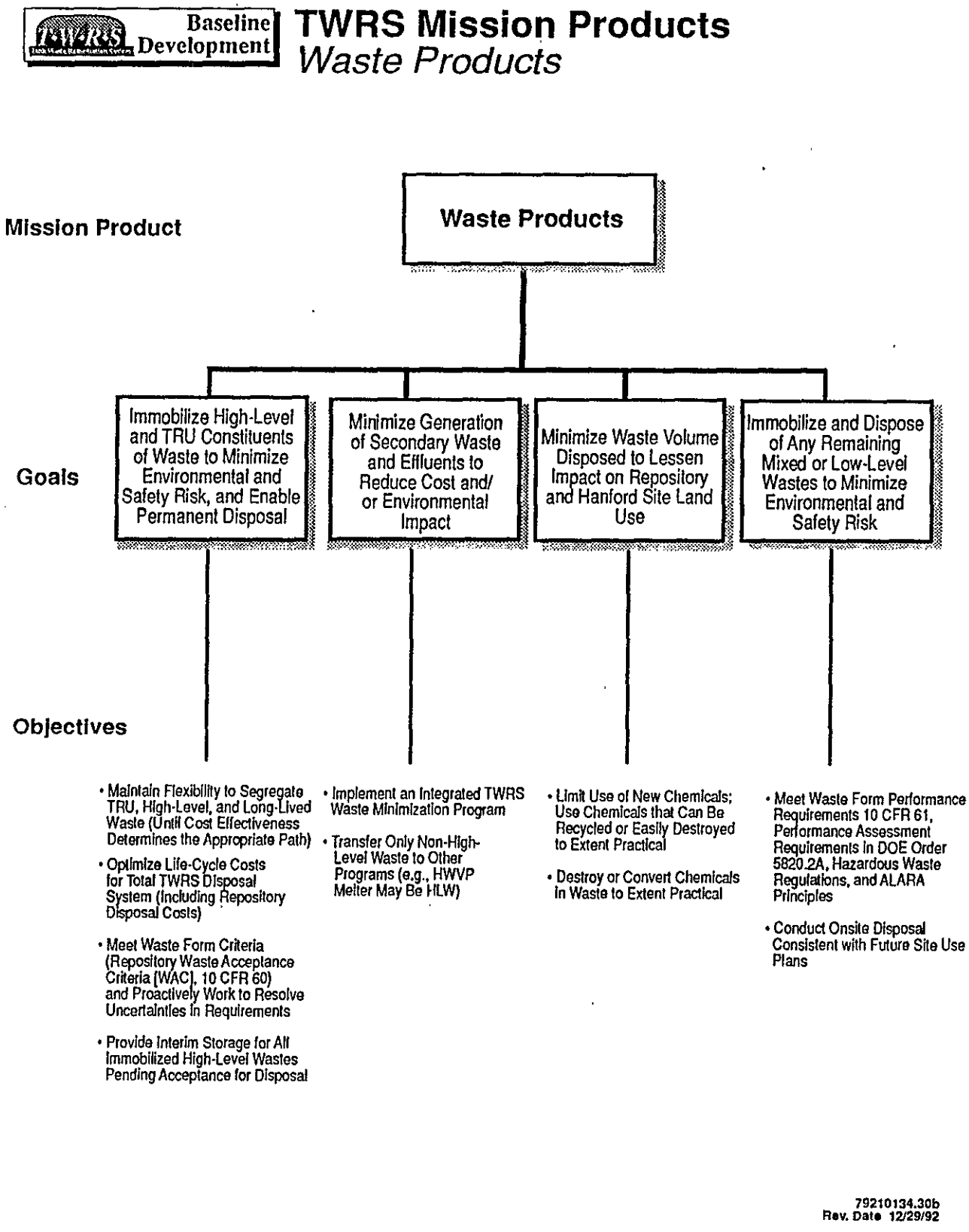


Figure A-5. TWRS Mission Products, Transfer Excess Facilities and Tanks to ER Program.

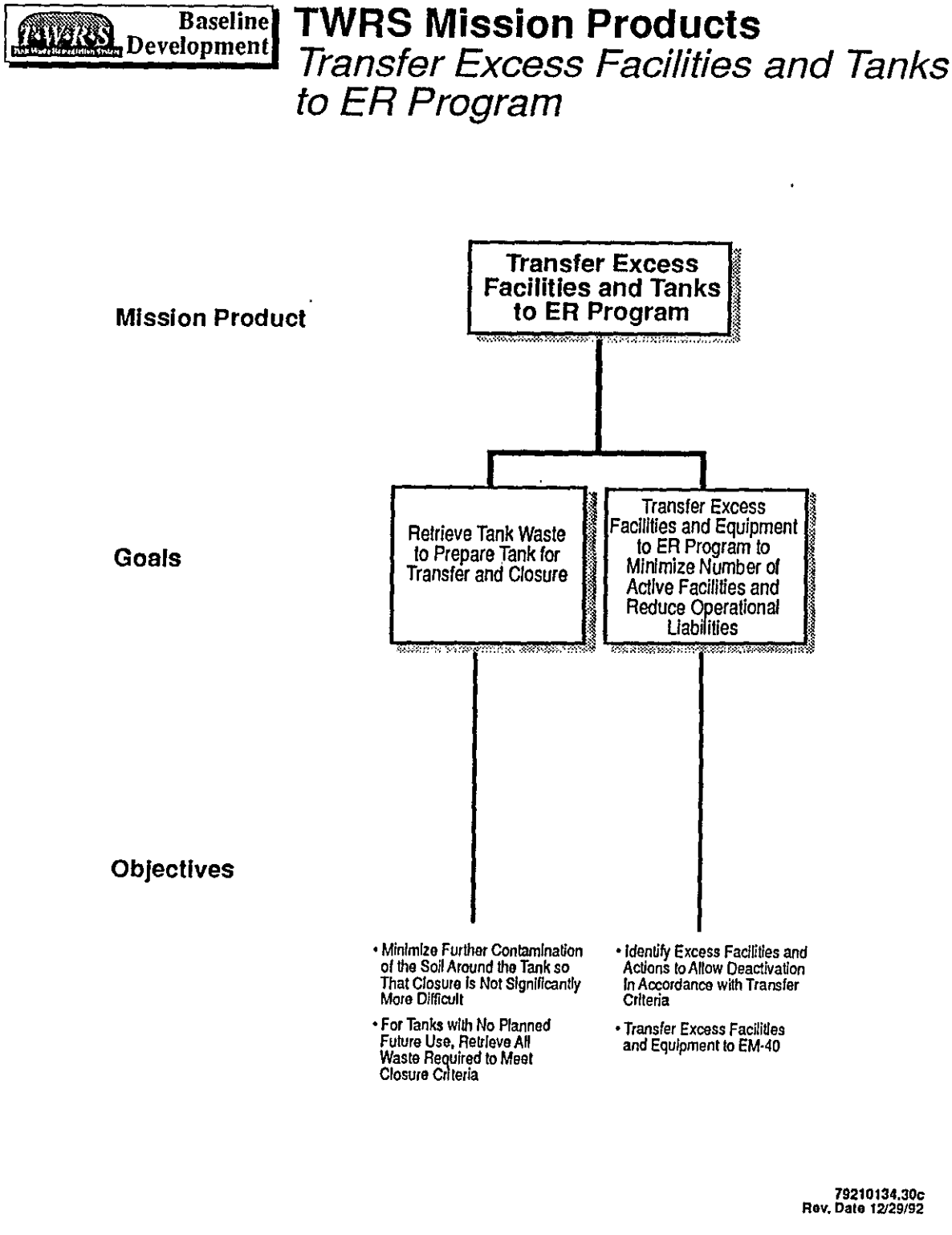


Figure A-6. TWRS Mission Products, Program Management.

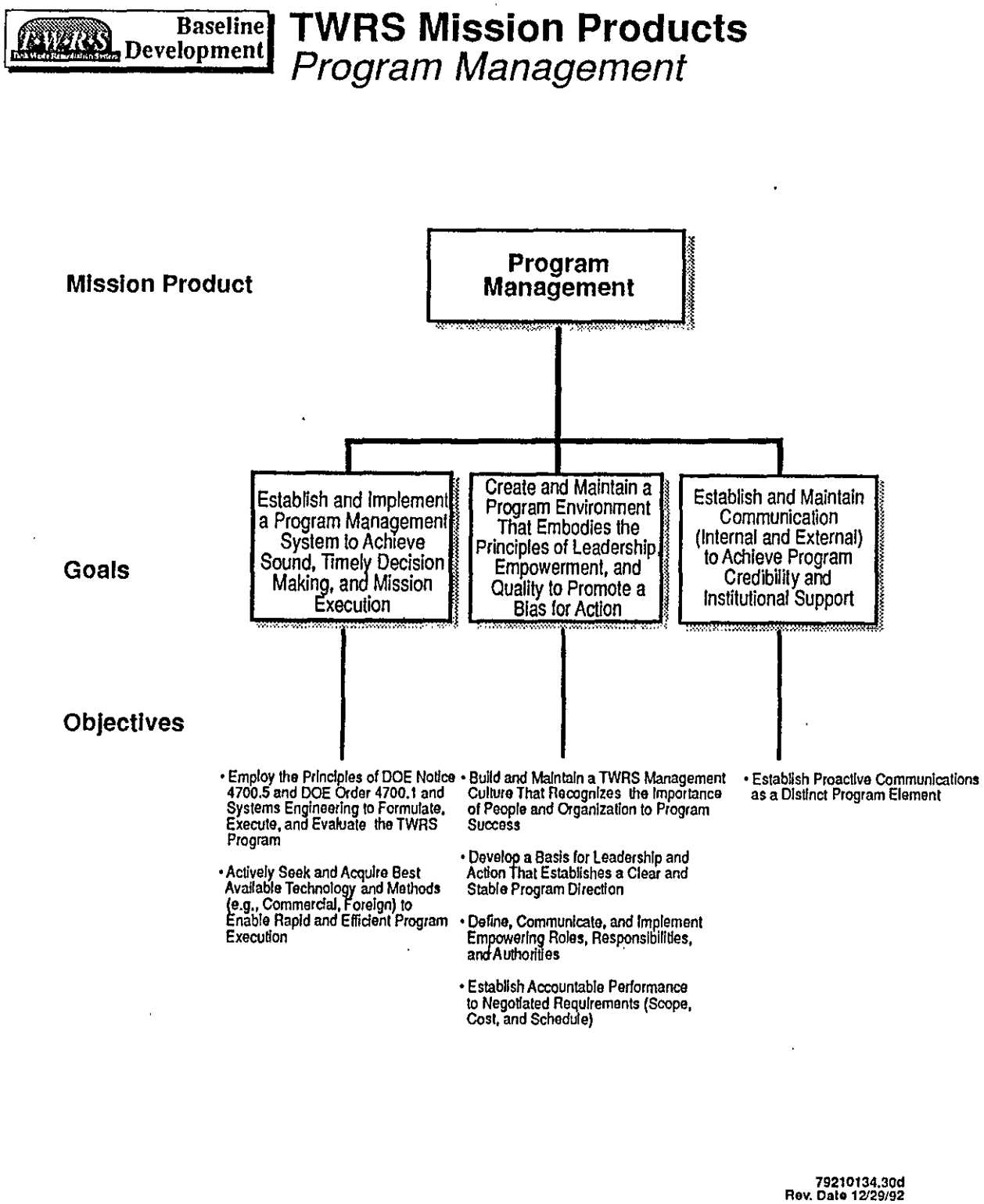
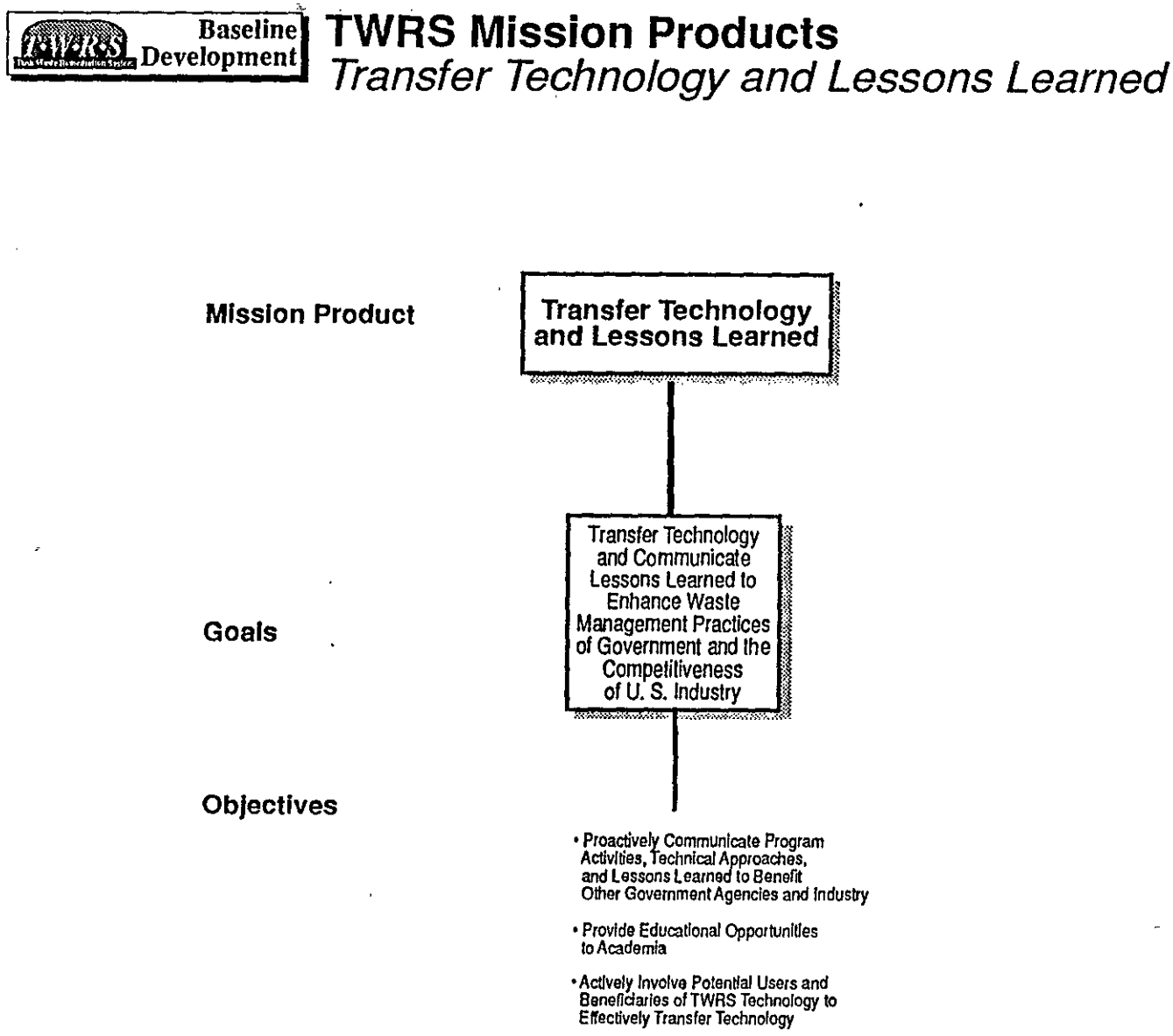


Figure A-7. TWRS Mission Products, Transfer Technology and Lessons Learned.



STORE TANK WASTE AND OTHER NUCLEAR MATERIALS (SEE FIGURE A-3)

Resolve Safety Issues and Upgrade Facilities to Provide Environmentally Sound and Safe Storage:

- Identify and resolve safety issues
  - Tables 1-1 and 3-1 of the Plan identify the upgrades that support the resolution of Safety Issues.
- Develop and maintain a comprehensive safety basis
  - This issue is discussed in Section 3.0, Safety Upgrades, and Section 6.7, Safety Documentation.
- Restore and upgrade facilities by applying a graded approach that balances cost with risks to achieve compliance
  - The Plan lists the necessary actions to restore and upgrade the facilities, and defines the potential consequences of not implementing each action. This information should be used in developing the graded approach.

Operate and Maintain Facilities to Provide Continued Environmentally Sound and Safe Storage:

- Characterize waste and maintain a credible database
  - Section 6.11, Data Management, supports the establishment and maintenance of a credible database.
- Store waste in a manner that does not negatively impact future retrieval, treatment, or immobilization (e.g., segregate waste types)
  - This objective is considered in all planned upgrades.
- Provide storage capacity for current and future tank waste
  - The Plan does not directly support this objective; however, the two new Tank Farm Projects mentioned in Section 6.12, Facilities, of the plan will support this need.

- Provide a capability (e.g., Multi-Purpose Storage Complex) to store other Hanford Site nuclear materials that have been prepared for storage
  - NA
- Develop capability and respond promptly to tank leaks
  - Sections 6.1, Conduct of Operations, 6.9, Instrumentation, and 6.10, Data Acquisition, address this issue.
- Reduce operating burden by consolidating operations where practical
  - Several new facilities addressed in Section 6.12, Facilities, support this objective. In particular, the planned Tank Farms Document Control Centers in 200 East and 200 West are vital to the consolidation of Tank Farm operations.

WASTE PRODUCTS (SEE FIGURE A-4)

Immobilize High-Level and TRU Constituents of Waste to Minimize Environmental and Safety Risk and Enable Permanent Disposal:

- Maintain flexibility to segregate TRU, high activity, and long-lived waste (until cost effectiveness determines the appropriate path)
  - NA
- Optimize life-cycle costs for total TWRS disposal system (including repository disposal costs)
  - NA
- Meet waste form criteria (Repository Waste Acceptance Criteria [WAC], 10 CFR 60[1]) and proactively work to resolve uncertainties in requirements
  - NA
- Provide interim storage for all immobilized high-level wastes pending acceptance for disposal
  - NA

Minimize Generation of Secondary Waste and Effluents to Reduce Cost and/or Environmental Impact:

- Implement an integrated TWRS Waste Minimization Program
  - Although the Plan does not address an integrated Waste Minimization Program, several of the individual upgrades will support such a Program. Project W-252, Phase II Liquid Effluent Program, and Project W-030, Tank Farm Ventilation Upgrades, will eliminate sources of waste water by providing closed-loop cooling systems. The two projects are discussed in Section 6.15, Mechanical Utilities. In addition, the tasks described in Section 6.18, Contaminated Zone Reduction/ALARA, will aid in the waste minimization efforts.

[1] 10 CFR 60, 1992, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," *Code of Federal Regulations*, as amended.

- Transfer only non-high-level waste to other programs (e.g., HWVP Melter may be HLW)

  - NA

Minimize Waste Volume Disposed to Lessen Impact on Repository and Hanford Site Land Use:

- Limit use of new chemicals; use chemicals that can be recycled or easily destroyed to extent practical

  - NA

- Destroy or convert chemicals in waste to extent practical

  - NA

Immobilize and Dispose of Any Remaining Mixed or Low-level Wastes to Minimize Environmental and Safety Risk:

- Meet Waste Form Performance Requirements 10 CFR 61,[2] performance assessment requirements in DOE Order 5820.2A,[3] hazardous waste regulations, and ALARA principles

  - NA

- Conduct onsite disposal consistent with future site use plans

  - NA

[2] 10 CFR 61, 1992, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal Regulations*, as amended.

[3] DOE, 1990, *Radioactive Waste Management*, DOE Order 5820.2A, U.S. Department of Energy, Washington, D.C.

TRANSFER EXCESS FACILITIES AND TANKS TO ER PROGRAM (SEE FIGURE A-5)

Retrieve Tank Waste to Prepare Tank For Transfer and Closure:

- Minimize further contamination of the soil around the tank so that closure is not significantly more difficult
  - The actions proposed in Section 6.18, Contamination Zone Reduction/ALARA, support this objective.
- For tanks with no planned future use, retrieve all waste required to meet closure criteria
  - Not directly supported, but all the upgrades will be planned to support the needs of the retrieval efforts.

Transfer Excess Facilities and Equipment to ER Program to Minimize Number of Active Facilities and Reduce Operational Liabilities:

- Identify excess facilities and actions to allow deactivation in accordance with transfer criteria
  - NA
- Transfer excess facilities and equipment to EM-40
  - NA

PROGRAM MANAGEMENT (SEE FIGURE A-6)

Establish and Implement A Program Management System to Achieve Sound, Timely Decision Making and Mission Execution:

- Employ the principles of DOE Notice 4700.5[4] and DOE Order 4700.1[5] and systems engineering to formulate, execute, and evaluate the TWRS program
  - This objective is supported by the Plan as a whole.
- Actively seek and acquire best available technology and methods (e.g., commercial, foreign) to enable rapid and efficient program execution
  - This objective is supported by the Plan as a whole.

Create and Maintain a Program Environment That Embodies The Principles of Leadership, Empowerment, and Quality to Promote a Bias for Action:

- Build and maintain a TWRS management culture that recognizes the importance of people and organization to program success
  - NA
- Develop a basis for leadership and action that establishes a clear and stable program direction.
  - The Plan is a source of technical information that should be used in support of this objective.
- Define, communicate, and implement empowering roles, responsibilities, and authorities
  - Section 6.1, Conduct of Operations and Section 6.2, Maintenance Management Programs, supports this objective.

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[4] DOE, 1992, *Project Control System Guidelines*, DOE Notice 4700.5, U.S. Department of Energy, Washington, D.C.

[5] DOE, 1987, *Project Management System*, DOE Order 4700.1, U.S. Department of Energy, Washington, D.C.

- Establish accountable performance to negotiated requirements (scope, cost, and schedule)
    - The Plan should be used as a source of information in support of this objective.

Establish and Maintain Communication (both Internal and External) to Achieve Program Credibility and Institutional Support:

- Establish proactive communications as a distinct program element
    - The Plan can be used as a communications tool, especially if it is revised periodically to keep pace with the changing environment of Tank Farms.

TRANSFER TECHNOLOGY AND LESSONS LEARNED (SEE FIGURE A-7)

Transfer Technology and Communicate Lessons Learned to Enhance Waste Management Practices of Government and the Competitiveness of U.S. Industry:

- Proactively communicate program activities, technical approaches, and lessons learned to benefit other government agencies and industry
  - NA
- Provide educational opportunities to academia
  - NA
- Actively involve potential users and beneficiaries of TWRS technology to effectively transfer technology
  - NA

APPENDIX B

TANK FARM CONDITION CHARTS

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APPENDIX B
TANK FARM CONDITION CHARTS

The Tank Farms condition charts shown in Figures B-1 through B-22 are being developed to present and track the status of Tank Farm systems, facilities, and operational concerns. The charts fall into six major categories, identified as Projects:

- Double-Shell Tanks
- Single-Shell Tanks (A-AX-C)
- Single-Shell Tanks (B-BX-BY)
- Single-Shell Tanks (T-TX-TY)
- Single-Shell Tanks (S-SX-U)
- Facilities.

The Single-Shell Tanks were split into four Projects because of the number of single-shell tanks and the limitations of the charts. Several charts are provided for each of the Projects. For quick reference, two additional charts are provided, listing only the Watchlist tanks and addressing only the applicable safety issues. The Projects and the groups, or charts, provided for each one are listed in Table B-1.

Each Project chart forms a matrix of facilities and items. Facilities are listed across the top of each chart, and a set of items is listed on the left-hand side. Each cell in the matrix will be evaluated according to the criteria listed on the right-hand side of the chart. When a cell, which represents a specific item at a specific facility, can be shown to meet all the criteria, the cell will be colored green. Otherwise, the cell will be shown as red. If an Item does not exist at or apply to a particular facility, the cell for that pairing will be hatched to show it as Not Applicable. Details of the status of each cell will be entered into a database that will be maintained by the Engineering Integration organization.

For review purposes, the layouts of the charts are provided in this phase of the Tank Farms Restoration and Upgrades Program Plan. Data for completion of the charts are being compiled. A completed set of charts will be included in Phase 2 of the Plan. The charts and accompanying database will be updated periodically to track the progress of the necessary upgrades.

Table B-1.

Project: Facilities

Project: Double-Shell Tanks
(28 DSTs, 6 Farms, 7 Other, 41 Facilities Total)
Group (Chart): Systems
Procedures
Safety Documentation
Safety Issues

Project: Single-Shell Tanks (A-AX-C)
(26 SSTs, 3 Farms, 29 Facilities Total)
Group (Chart): Systems
Procedures
Safety Documentation
Safety Issues

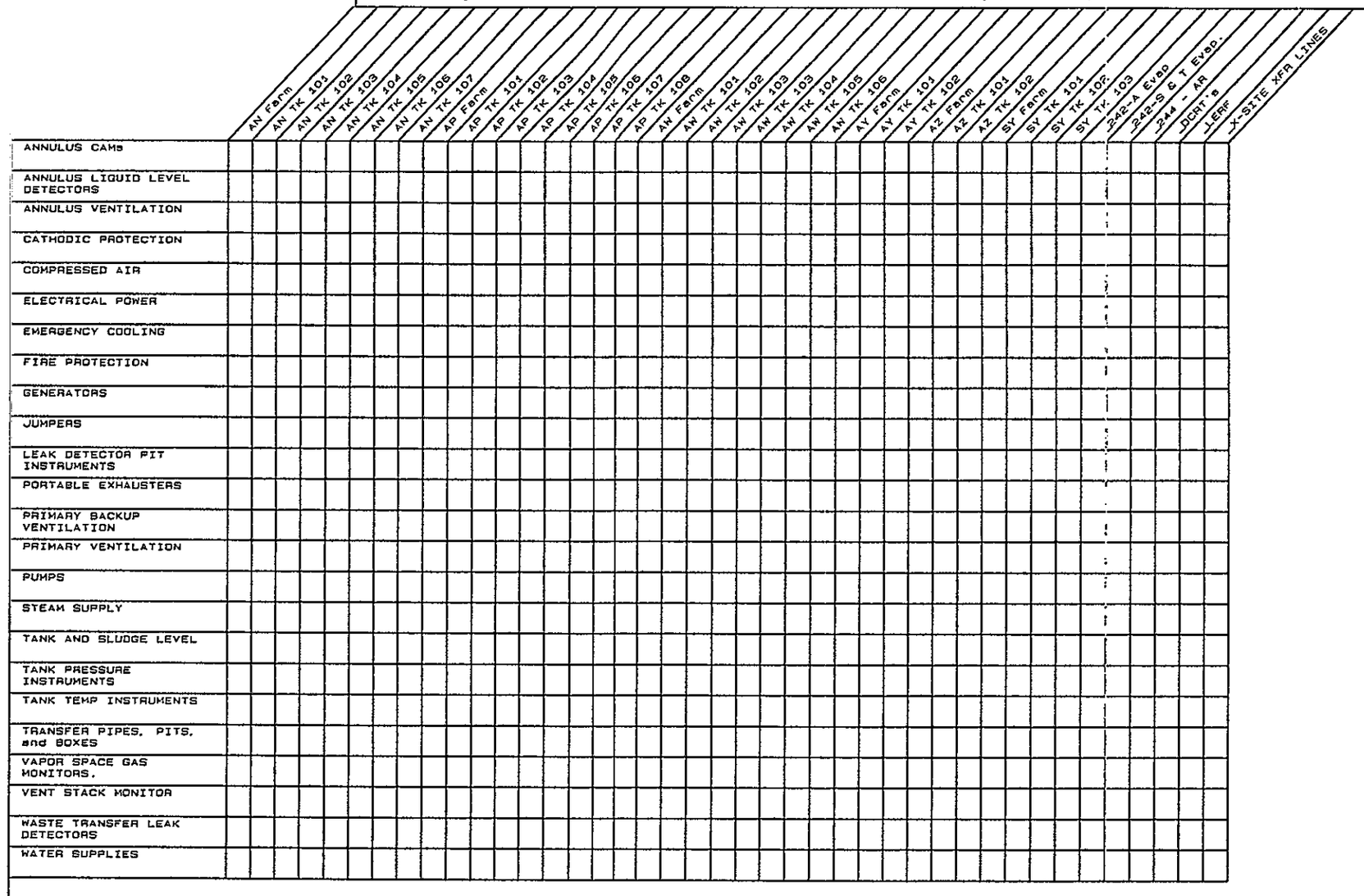
Project: Single-Shell Tanks (B-BX-BY)
(40 SSTs, 3 Farms, 43 Facilities Total)
Group (Chart): Systems
Procedures
Safety Documentation
Safety Issues

Project: Single-Shell Tanks (T-TX-TY)
(40 SSTs, 3 Farms, 43 Facilities Total)
Group (Chart): Systems
Procedures
Safety Documentation
Safety Issues

Project: Single-Shell Tanks (S-SX-U)
(43 SSTs, 3 Farms, 46 Facilities Total)
Group (Chart): Systems
Procedures
Safety Documentation
Safety Issues

Project: Watchlist Tanks (Flammable Gas, High Heat)
(19 SSTs, 5 DSTs, 24 Total)
Group (Chart): Safety Issues

Project: Watchlist Tanks (Ferrocyanide, Organic Salt)
(32 SSTs)
Group (Chart): Safety Issues



Criteria

1) System is Fully Operable

2) System Meets Todays Criteria, Standards and Regs.

3) System requires only normal maintenance and/or calibration.

4) System is Cost Effectively Maintainable.

5) System is Acceptably Reliable - atleast a 5 Year life.

6) System performance is consistent with current safety analysis.

7) System meets all operational requirements.

- Criteria Not Fulfilled
- Criteria Fulfilled
- Not Applicable
- Data Not Yet Compiled

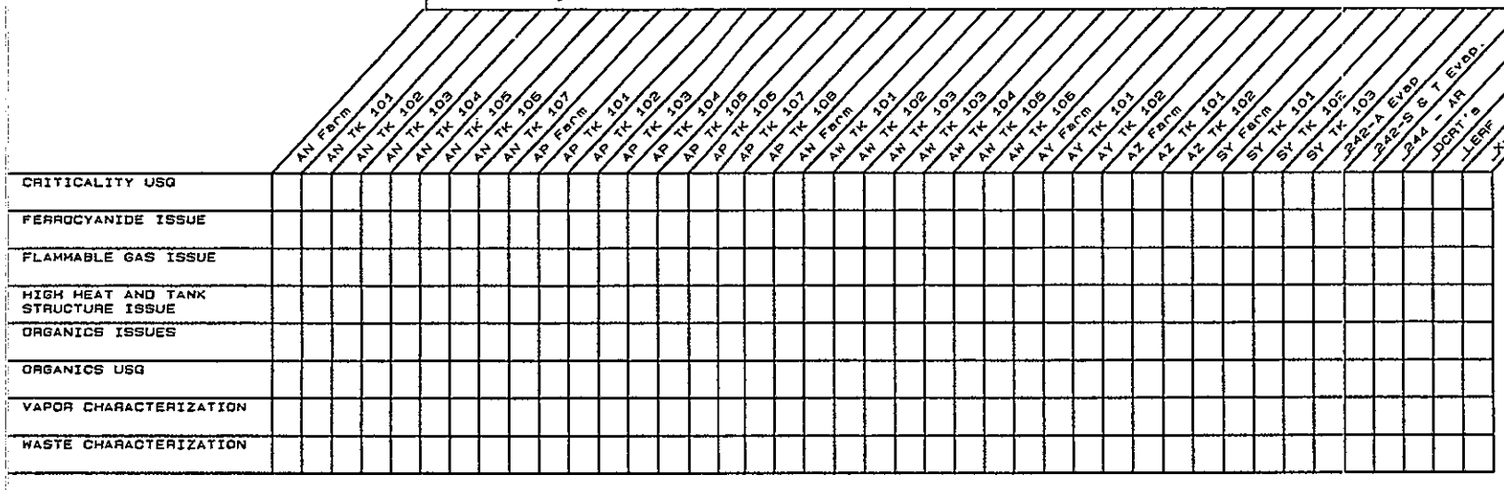
Figure B-1

Double Shell Tanks
Systems

01/22/93

TANK FARM CONDITION CHART

Project: Double Shell Tanks Group: Safety Issues



Criteria

1) Issue-specific remediation plan has been developed and is being followed.

2) (If a USQ) Ultimate resolution completed in accordance with DOE Order 5480.21 and MRP 5.12.

3) Issue is resolved in accordance with issue specific remediation plan

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

Data Not Yet Compiled

Figure B-2

Double Shell Tanks

Safety Issues

01/22/93

TANK FARM CONDITION CHART

Project: Double Shell Tanks Group: Safety Documentation

	AN Farm	AN TK 101	AN TK 102	AN TK 103	AN TK 104	AN TK 105	AN TK 106	AN TK 107	AP Farm	AP TK 101	AP TK 102	AP TK 103	AP TK 104	AP TK 105	AP TK 106	AP TK 107	AP TK 108	AW Farm	AW TK 101	AW TK 102	AW TK 103	AW TK 104	AW TK 105	AY Farm	AY TK 101	AY TK 102	AZ Farm	AZ TK 101	AZ TK 102	SY Farm	SY TK 101	SY TK 102	SY Tk. 103	242-A Evap	242-S & T Evap.	244 - AR	DCRT's	LERF	X-SITE XFR LINES
COMPONENT LABELING																																						
ESSENTIAL DRAWINGS																																						
FINAL SAFETY BASIS																																						
FINAL SAFETY EQUIPMENT LIST - COMPONENT LVL																																						
FINAL SAFETY EQUIPMENT LIST - SYSTEM LVL																																						
IEFDs, EFDs, and P&IDs																																						
INTERIM SAFETY BASIS																																						
INTERIM SAFETY EQUIPMENT LIST - COMPONENT LVL																																						
INTERIM SAFETY EQUIPMENT LIST - SYSTEM LVL																																						
OSR																																						
SAFETY ANALYSIS REPORT																																						
SYSTEM DESIGN DESCRIPTION																																						

Criteria

1) Complies with DOE directives

2) Complies with applicable WHC CM Requirements.

3) Is consistent with current plant condition.

- Criteria Not Fulfilled
- Criteria Fulfilled
- Not Applicable
- Data Not Yet Compiled

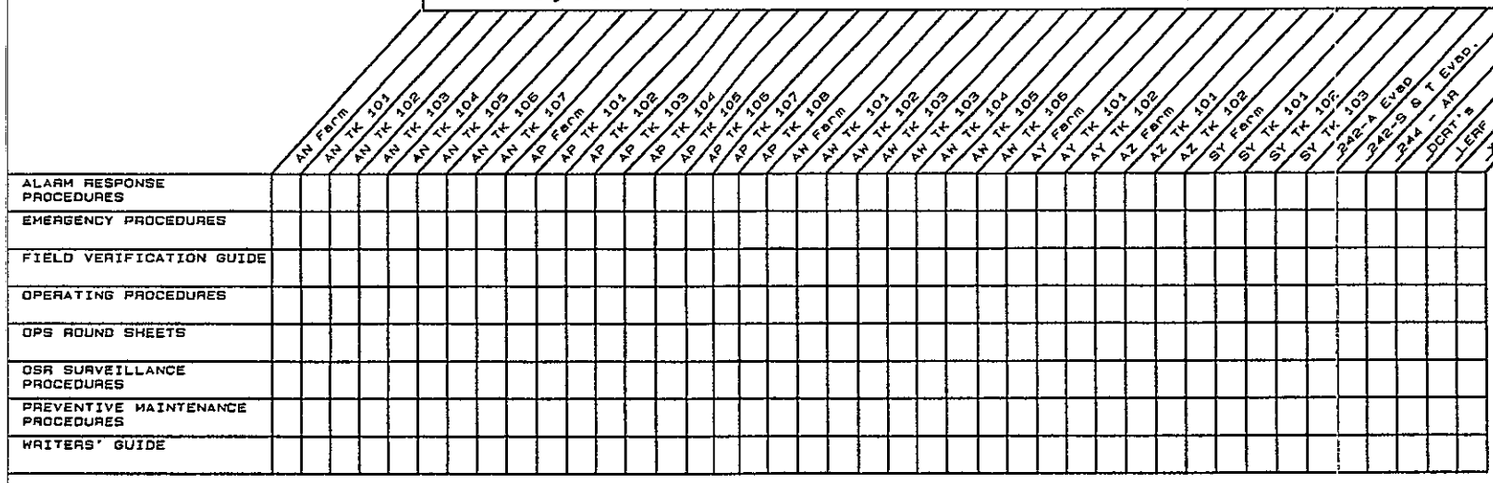
Figure B-3

Double Shell Tanks
Safety Documentation

01/22/93

TANK FARM CONDITION CHART

Project: Double Shell Tanks Group: Procedures



Criteria

1) Procedures comply with applicable DOE directives.

2) Procedures comply with applicable WHC CM requirements.

3) Procedures are consistent with current safety basis.

4) Procedures are consistent with current plant conditions.

5) Training program is consistent with current procedures.

6) Workers are fully trained in procedures.

7) Procedures are fully implemented.

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

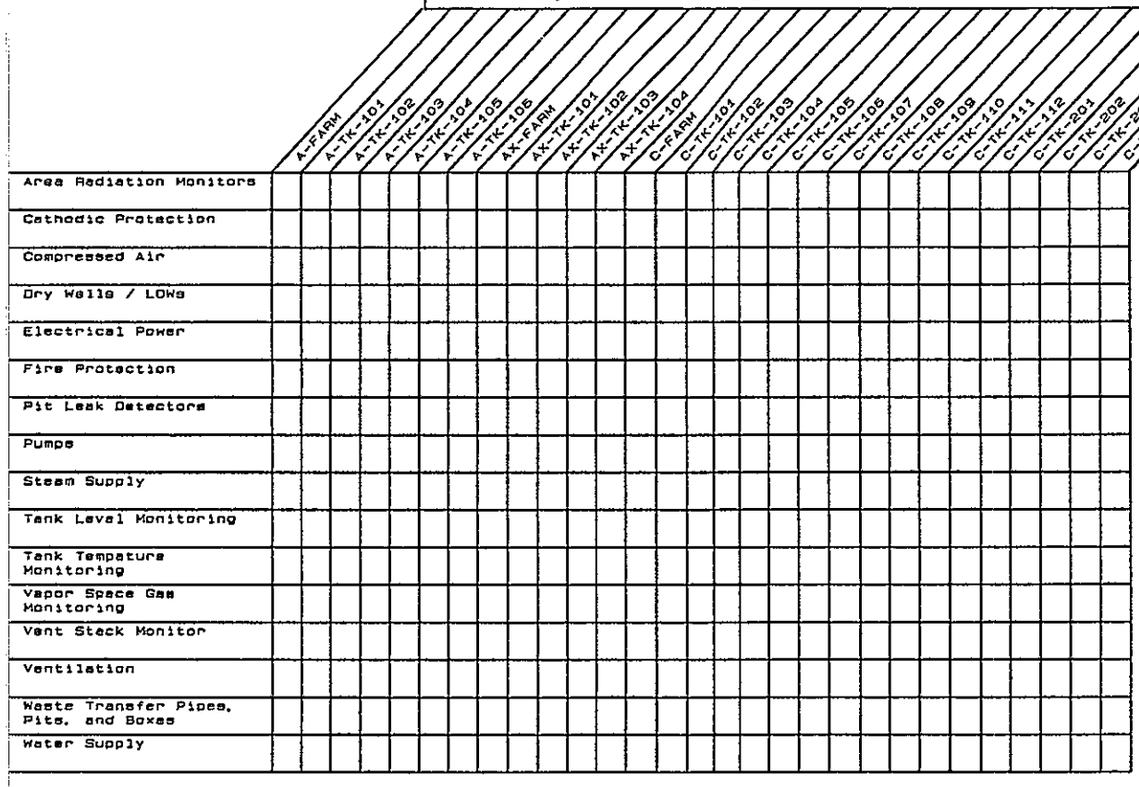
Data Not Yet Compiled

Figure B-4

Double Shell Tanks

Procedures

01/22/93



Criteria

1) System is fully operable.

2) System meets todays standards and regs.

3) System requires only normal maintenance and/or calibration.

4) System is cost effectively maintainable.

5) System is acceptably reliable and expected to remain so for at least 5 years.

6) System performance is consistent with current safety analysis

7) System meets all operational requirements.

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

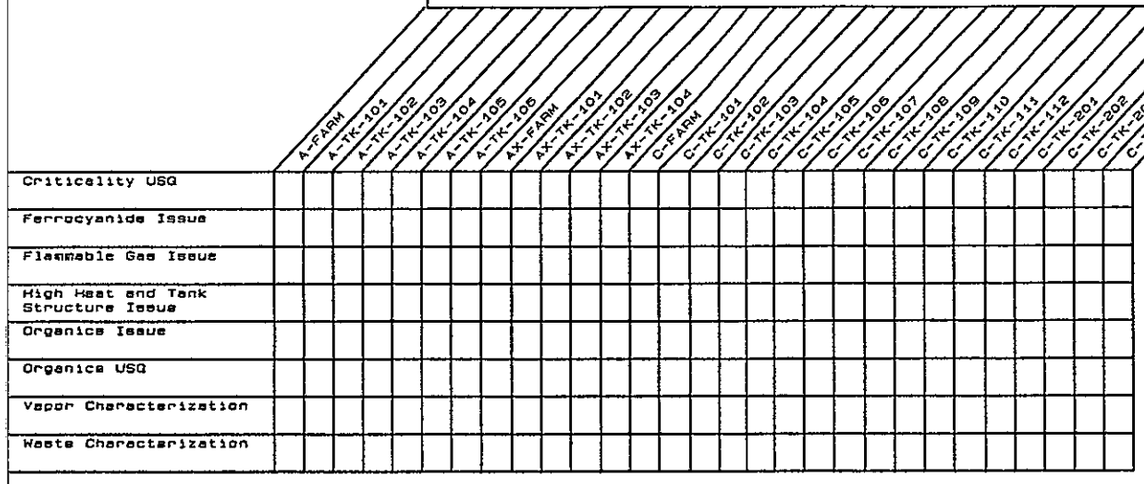
Data Not Yet Compiled

Figure B-5

Single Shell Tanks (A-AX-C)
Systems

01/22/93

Project: Single Shell Tanks (A-AX-C) Group: Safety Issues



Criteria

1) Issue-specific remediation plan has been developed and is being followed.

2) (If a USQ) Ultimate resolution completed in accordance with DOE order 5480.21 and MRP 5.12.

3) Issue is resolved according to the issue-specific remediation plan.

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

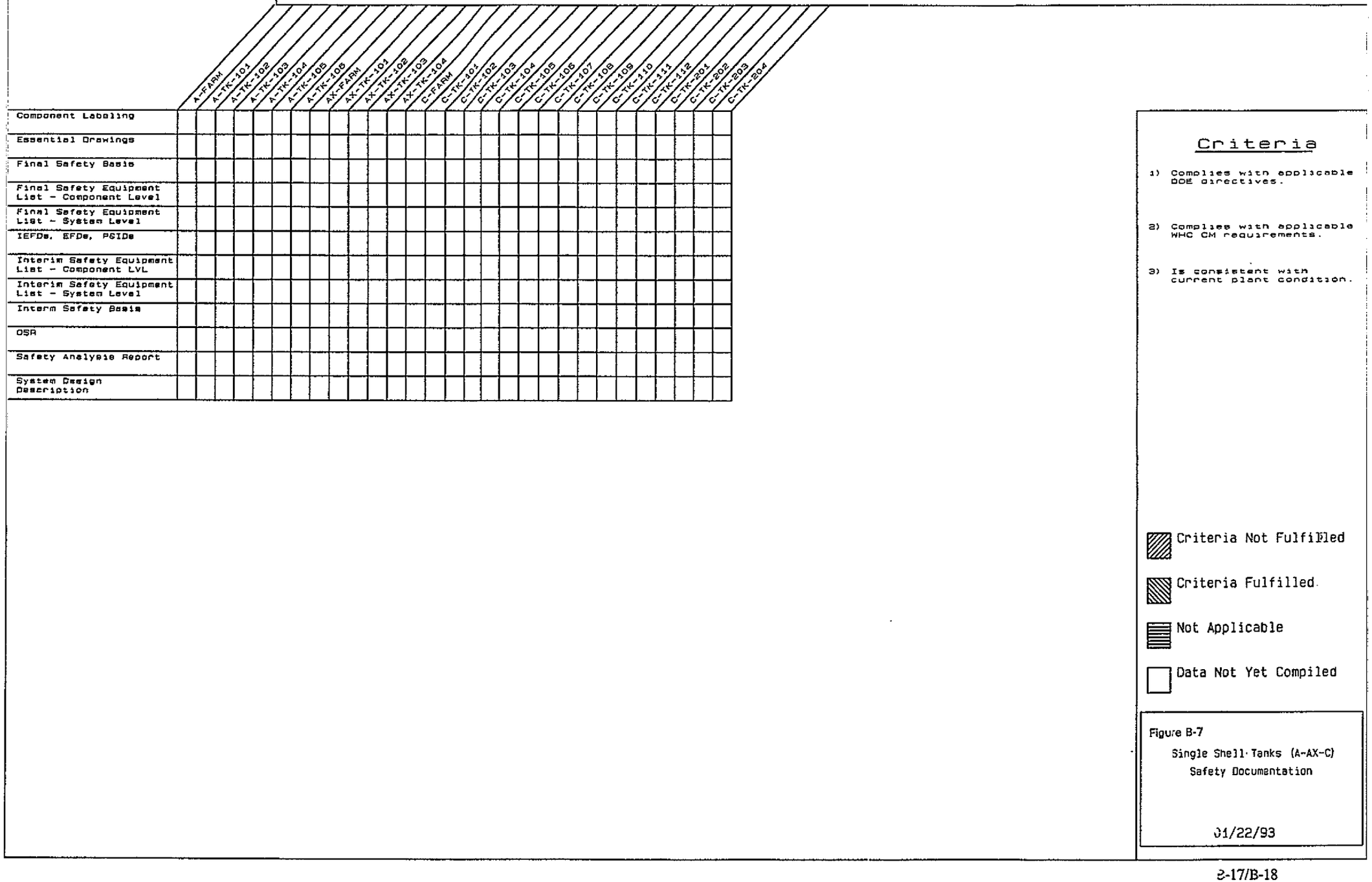
Data Not Yet Compiled

Figure B-6

Single Shell Tanks (A-AX-C)
Safety Issues

01/22/93

Project: Single Shell Tanks (A-AX-C) Group: Safety Documentation



Criteria

1) Complies with applicable DOE directives.

2) Complies with applicable WHC CM requirements.

3) Is consistent with current plant condition.

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

Data Not Yet Compiled

Figure B-7
Single Shell Tanks (A-AX-C)
Safety Documentation

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (A-AX-C) Group: Procedures

	A-FARM	A-TK-101	A-TK-102	A-TK-103	A-TK-104	A-TK-105	A-TK-106	AX-FARM	AX-TK-101	AX-TK-102	AX-TK-103	AX-TK-104	C-FARM	C-TK-101	C-TK-102	C-TK-103	C-TK-104	C-TK-105	C-TK-106	C-TK-107	C-TK-108	C-TK-109	C-TK-110	C-TK-111	C-TK-112	C-TK-201	C-TK-202	C-TK-203	C-TK-204
Alarm Response Procedures																												
Emergency Procedures																												
Field Verification Guide																												
Operating Procedures																												
OPS Round Sheets																												
OSR Surveillance Procedures																												
Preventive Maintenance Procedures																												
Writer's Guide																												

Criteria

1) Procedures Comply with Applicable DOE Directives.

2) Procedures Comply with applicable WHC CM Requirements.

3) Procedures are consistent with current safety basis.

4) Procedures are consistent with current plant condition.

5) Training program is consistent with current procedures.

6) Workers are fully trained in procedures.

7) Procedures are fully implemented.

Criteria Not Fulfilled

Criteria Fulfilled

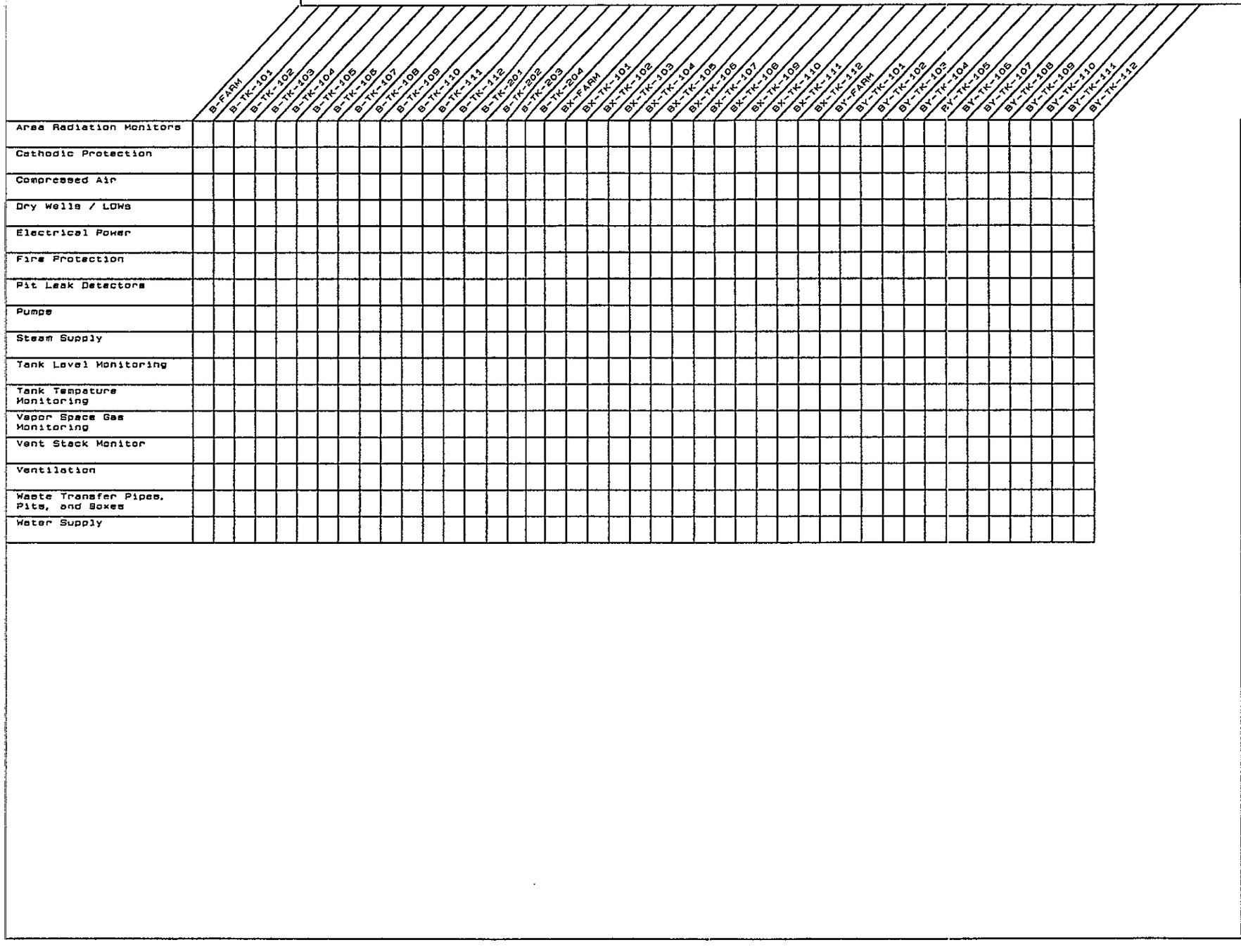
Not Applicable

Data Not Yet Compiled

Figure B-8

Single Shell Tanks (A-AX-C)
Procedures

01/22/93



Criteria

1) System is fully operable.

2) System meets todays standards and regs.

3) System requires only normal maintenance and/or calibration.

4) System is cost effectively maintainable.

5) System is acceptably reliable and expected to remain so for at least 5 years.

6) System performance is consistent with current safety analysis.

7) System meets all operational requirements.

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

Data Not Yet Compiled

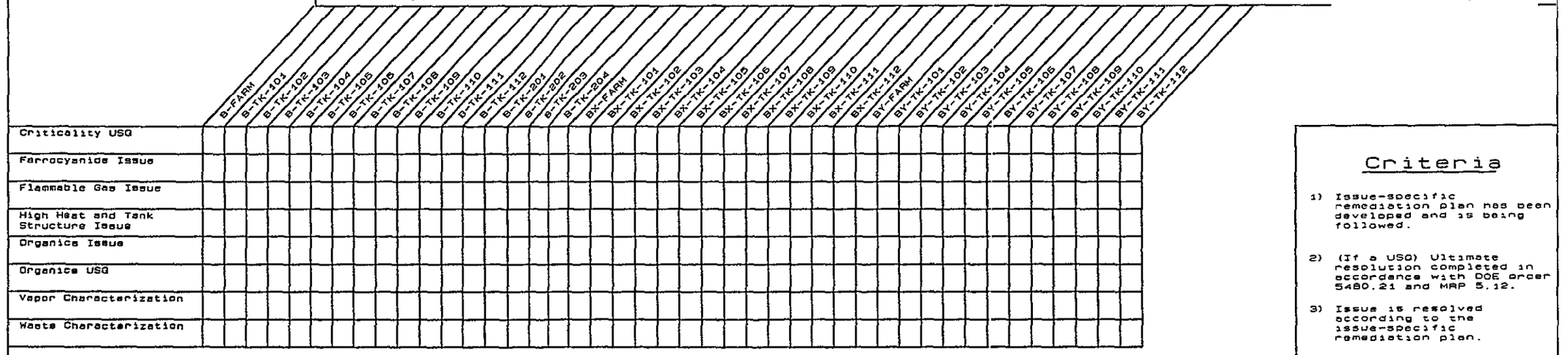
Figure B-9

Single Shell Tanks (B-BX-BY)
Systems

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (B-BX-BY) Group: Safety Issues



Criteria

1) Issue-specific remediation plan has been developed and is being followed.

2) (If a USQ) Ultimate resolution completed in accordance with DOE order 5480.21 and MRP 5.12.

3) Issue is resolved according to the issue-specific remediation plan.

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

Data Not Yet Compiled

Figure B-10

Single Shell Tanks (B-BX-BY)
Safety Issues

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (B-BX-BY) Group: Safety Documentation

	B-FARM	B-TK-101	B-TK-102	B-TK-103	B-TK-104	B-TK-105	B-TK-106	B-TK-107	B-TK-108	B-TK-109	B-TK-110	B-TK-111	B-TK-112	B-TK-201	B-TK-202	B-TK-203	B-TK-204	BX-FARM	BX-TK-101	BX-TK-102	BX-TK-103	BX-TK-104	BX-TK-105	BX-TK-106	BX-TK-107	BX-TK-108	BX-TK-109	BX-TK-110	BX-TK-111	BX-TK-112	BY-FARM	BY-TK-101	BY-TK-102	BY-TK-103	BY-TK-104	BY-TK-105	BY-TK-106	BY-TK-107	BY-TK-108	BY-TK-109	BY-TK-110	BY-TK-111	BY-TK-112
Component Labeling																																												
Essential Drawings																																												
Final Safety Basis																																												
Final Safety Equipment List - Component Level																																												
Final Safety Equipment List - System Level																																												
IEFDs, EFDs, P&IDs																																												
Interim Safety Equipment List - Component LVL																																												
Interim Safety Equipment List - System Level																																												
Interm Safety Basis																																												
OSR																																												
Safety Analysis Report																																												
System Design Description																																												

Criteria

1) Complies with applicable DOE directives.

2) Complies with applicable WHC CM requirements.

3) Is consistent with current plant condition.

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

Data Not Yet Compiled

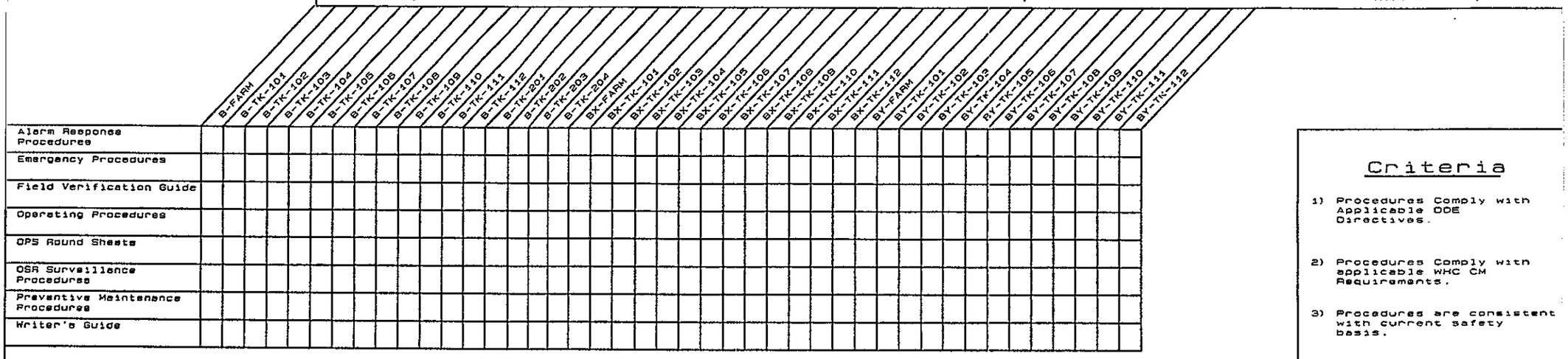
Figure B-11

Single Shell Tanks (B-BX-BY)
Safety Documentation

01/22/93

AX FARM CONDITION CHART

Project: Single Shell Tanks (B-BX-BY) Group: Procedures



Criteria

1) Procedures Comply with Applicable DOE Directives.

2) Procedures Comply with applicable WHC CM Requirements.

3) Procedures are consistent with current safety basis.

4) Procedures are consistent with current plant condition.

5) Training program is consistent with current procedures.

6) Workers are fully trained in procedures.

7) Procedures are fully implemented.

- Criteria Not Fulfilled
- Criteria Fulfilled
- Not Applicable
- Data Not Yet Compiled

Figure B-12

Single Shell Tanks (B-BX-BY)
Procedures

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (S-SX-U) Group: Systems

	S-FARM	S-TK-101	S-TK-102	S-TK-103	S-TK-104	S-TK-105	S-TK-106	S-TK-107	S-TK-108	S-TK-109	S-TK-110	S-TK-111	S-TK-112	SX-FARM	SX-TK-101	SX-TK-102	SX-TK-103	SX-TK-104	SX-TK-105	SX-TK-106	SX-TK-107	SX-TK-108	SX-TK-109	SX-TK-110	SX-TK-111	SX-TK-112	SX-TK-113	SX-TK-114	SX-TK-115	U-FARM	U-TK-101	U-TK-102	U-TK-103	U-TK-104	U-TK-105	U-TK-106	U-TK-107	U-TK-109	U-TK-110	U-TK-111	U-TK-112	U-TK-201	U-TK-202	U-TK-203	U-TK-204
Area Radiation Monitors																																													
Cathodic Protection																																													
Compressed Air																																													
Dry Wells / LDWs																																													
Electrical Power																																													
Fire Protection																																													
Pit Leak Detectors																																													
Pumps																																													
Steam Supply																																													
Tank Level Monitoring																																													
Tank Tempature Monitoring																																													
Vapor Space Gas Monitoring																																													
Vent Stack Monitor																																													
Ventilation																																													
Waste Transfer Pipes, Pits, and Boxes																																													
Water Supply																																													

Criteria

1) System is fully operable.

2) System meets todays standards and regs.

3) System requires only normal maintenance and/or calibration.

4) System is cost effectively maintainable.

5) System is acceptably reliable and expected to remain so for at least 5 years.

6) System performance is consistent with current safety analysis.

7) System meets all operational requirements.

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

Data Not Yet Compiled

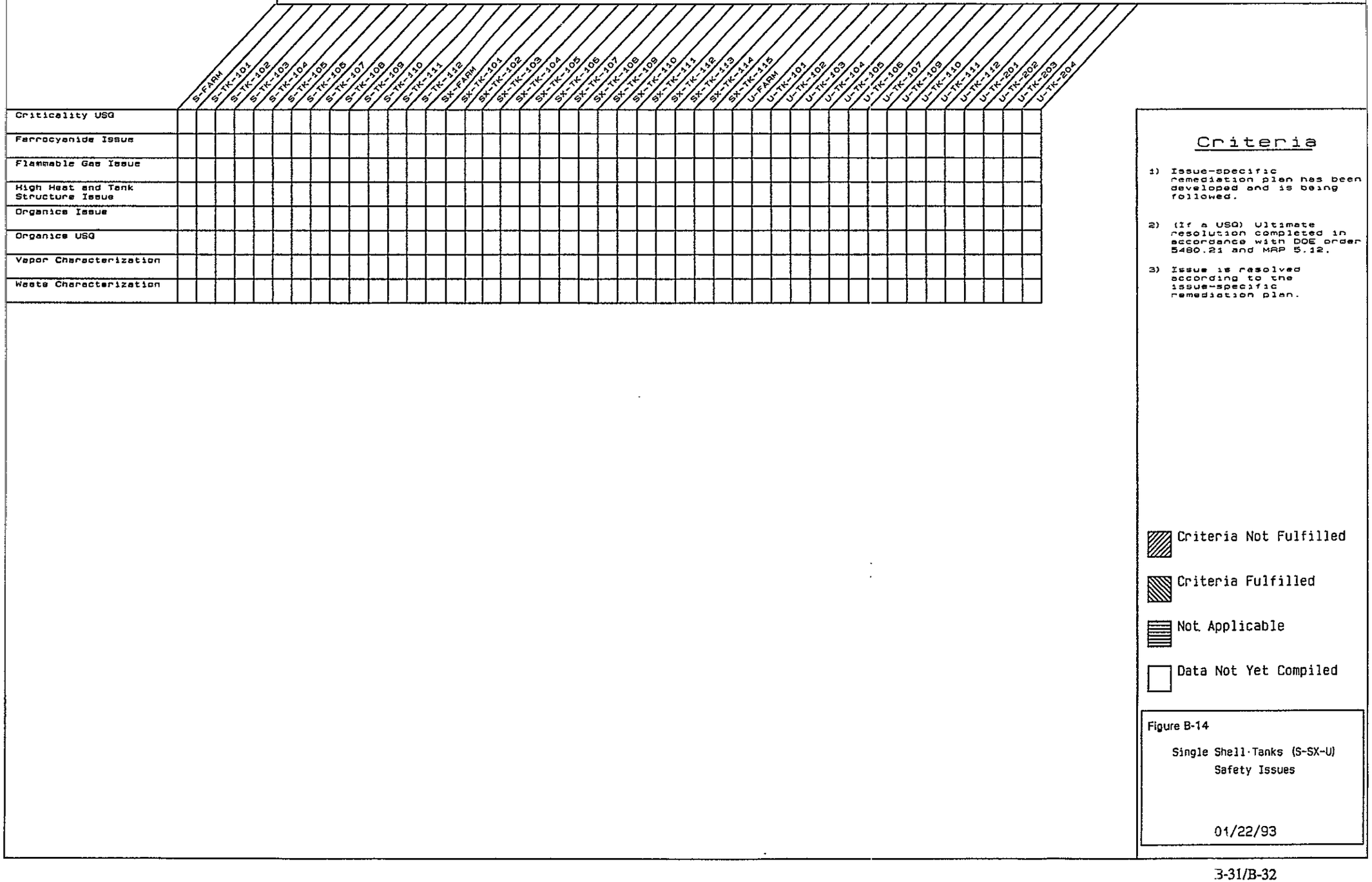
Figure B-13

Single Shell Tanks (S-SX-U) Systems

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (S-SX-U) Group: Safety Issues



Criteria

1) Issue-specific remediation plan has been developed and is being followed.

2) (If a USQ) Ultimate resolution completed in accordance with DOE order 5480.21 and MRP 5.12.

3) Issue is resolved according to the issue-specific remediation plan.

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

Data Not Yet Compiled

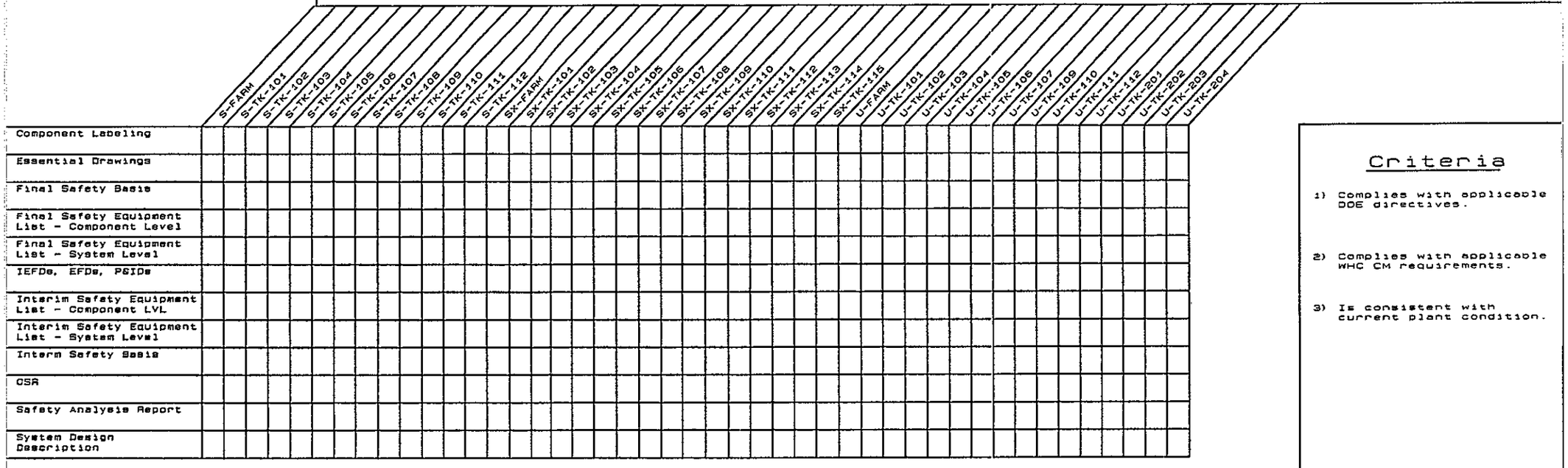
Figure B-14

Single Shell Tanks (S-SX-U)
Safety Issues

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (S-SX-U) **Group:** Safety Documentation



Criteria

1) Complies with applicable DOE directives.

2) Complies with applicable WHC CM requirements.

3) Is consistent with current plant condition.

- Criteria Not Fulfilled
- Criteria Fulfilled
- Not Applicable
- Data Not Yet Compiled

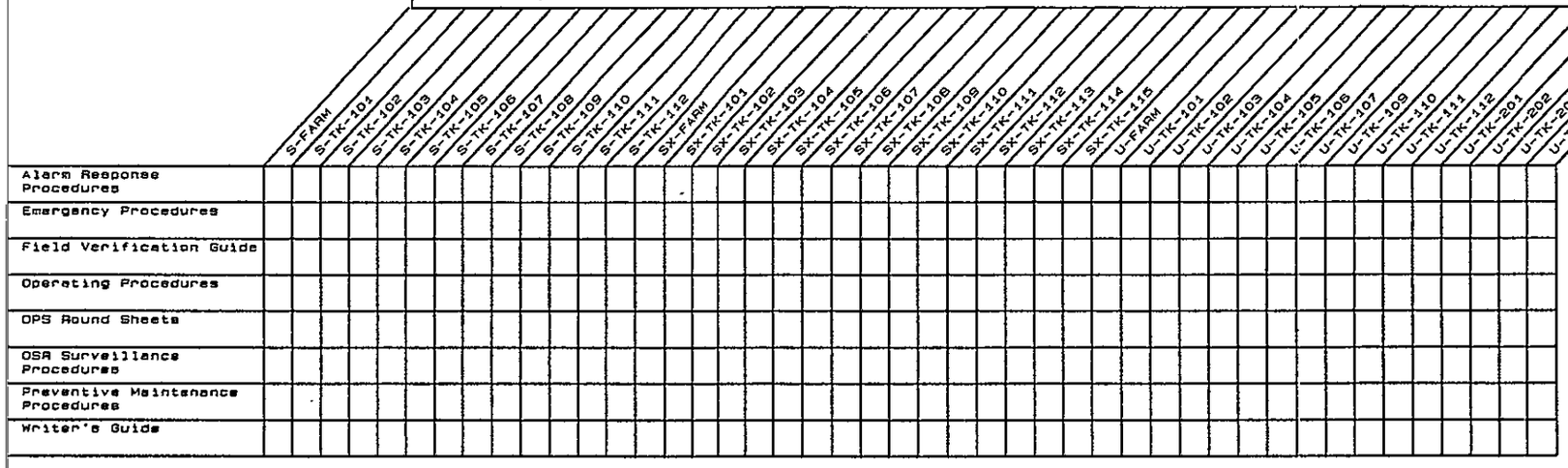
Figure B-15

Single Shell Tanks (S-SX-U)
Safety Documentation

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (S-SX-U) Group: Procedures



Criteria

1) Procedures Comply with Applicable DOE Directives.

2) Procedures Comply with applicable WHC CM Requirements.

3) Procedures are consistent with current safety basis.

4) Procedures are consistent with current plant condition.

5) Training program is consistent with current procedures.

6) Workers are fully trained in procedures.

7) Procedures are fully implemented.

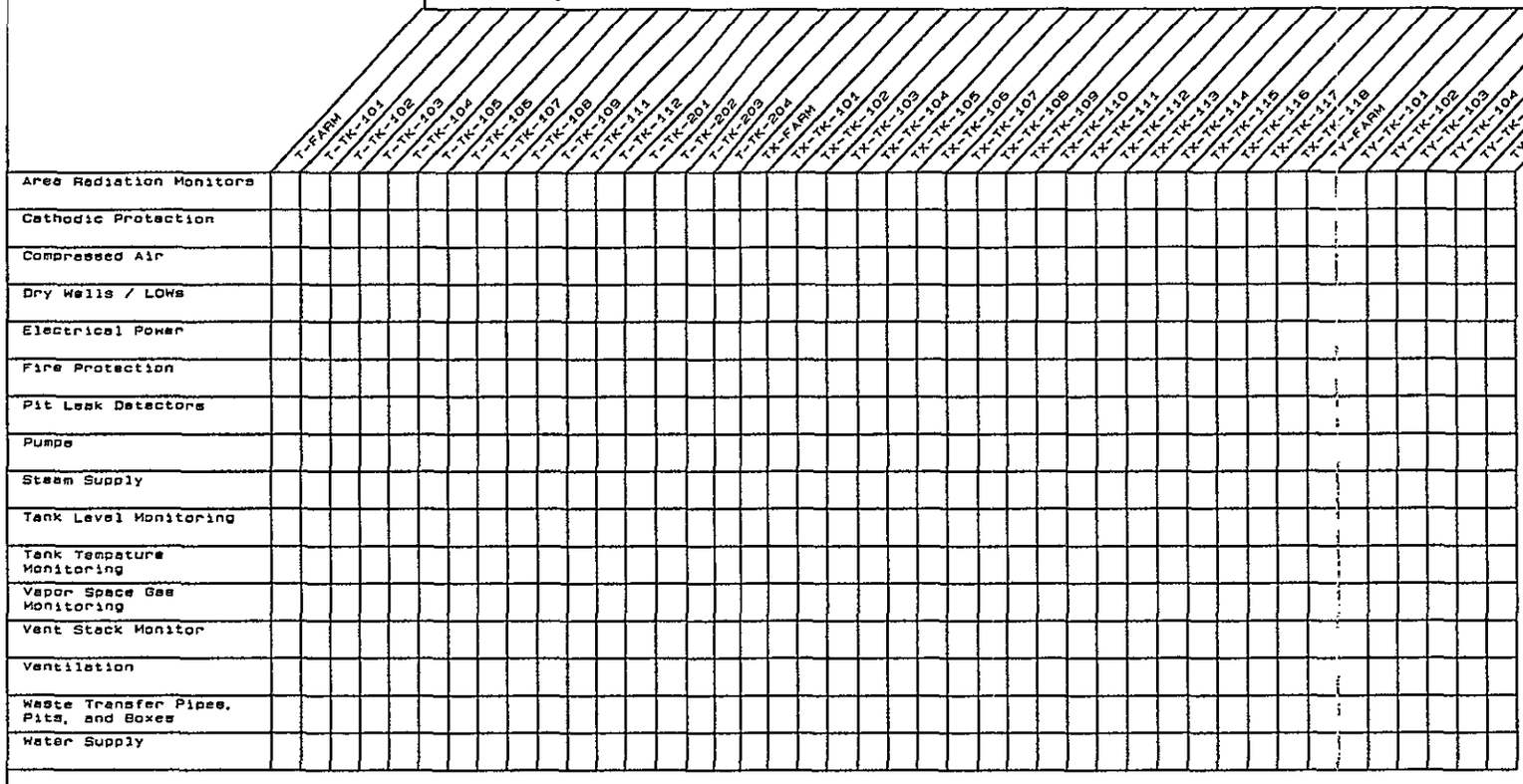
- Criteria Not Fulfilled
- Criteria Fulfilled
- Not Applicable
- Data Not Yet Compiled

Figure B-16
Single Shell Tanks (S-SX-U)
Procedures

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (T-TX-TY) Group: Systems



Criteria

1) System is fully operable.

2) System meets todays standards and regs.

3) System requires only normal maintenance and/or calibration.

4) System is cost effectively maintainable.

5) System is acceptably reliable and expected to remain so for at least 5 years.

6) System performance is consistent with current safety analysis.

7) System meets all operational requirements.

Criteria Not Fulfilled

Criteria Fulfilled

Not Applicable

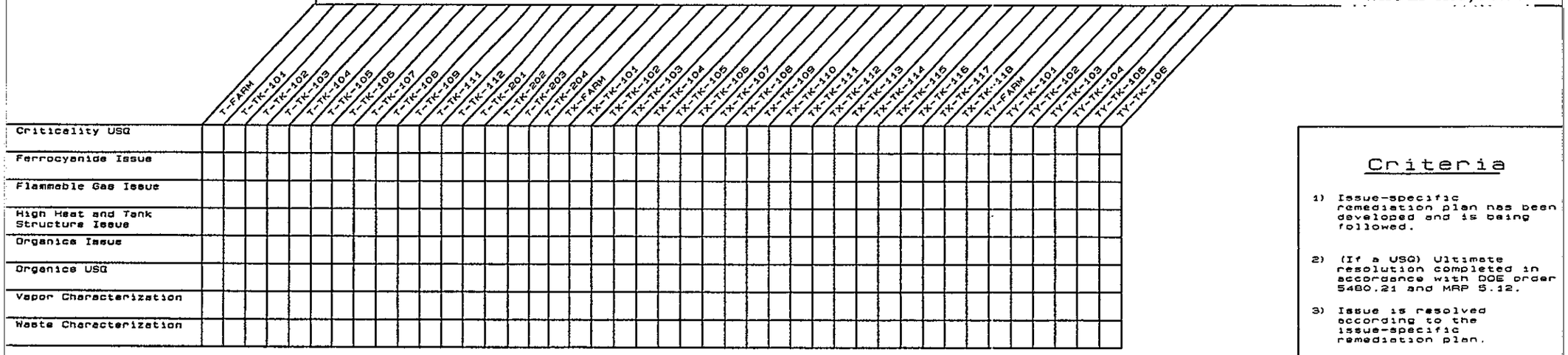
Data Not Yet Compiled

Figure B-17
Single Shell Tanks (T-TX-TY)
Systems

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (T-TX-TY) Group: Safety Issues



Criteria

1) Issue-specific remediation plan has been developed and is being followed.

2) (If a USQ) Ultimate resolution completed in accordance with DOE order 5480.21 and MRP 5.12.

3) Issue is resolved according to the issue-specific remediation plan.

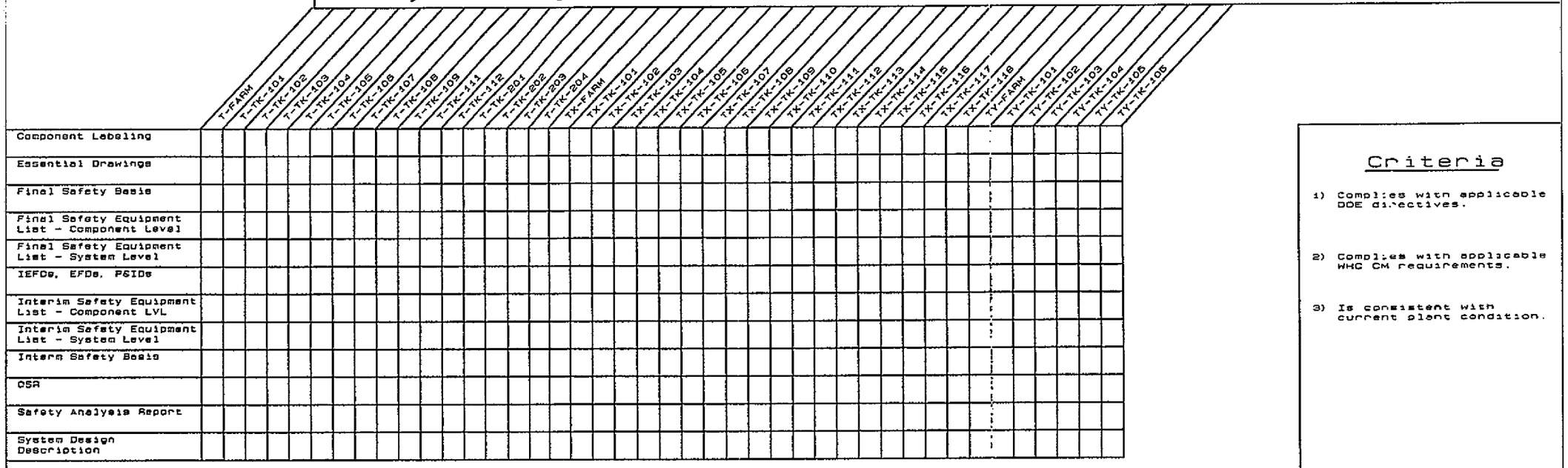
- Criteria Not Fulfilled
- Criteria Fulfilled
- Not Applicable
- Data Not Yet Compiled

Figure B-18
Single Shell Tanks (T-TX-TY)
Safety Issues

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (T-TX-TY) Group: Safety Documentation



Criteria

1) Complies with applicable DOE directives.

2) Complies with applicable WHC CM requirements.

3) Is consistent with current plant condition.

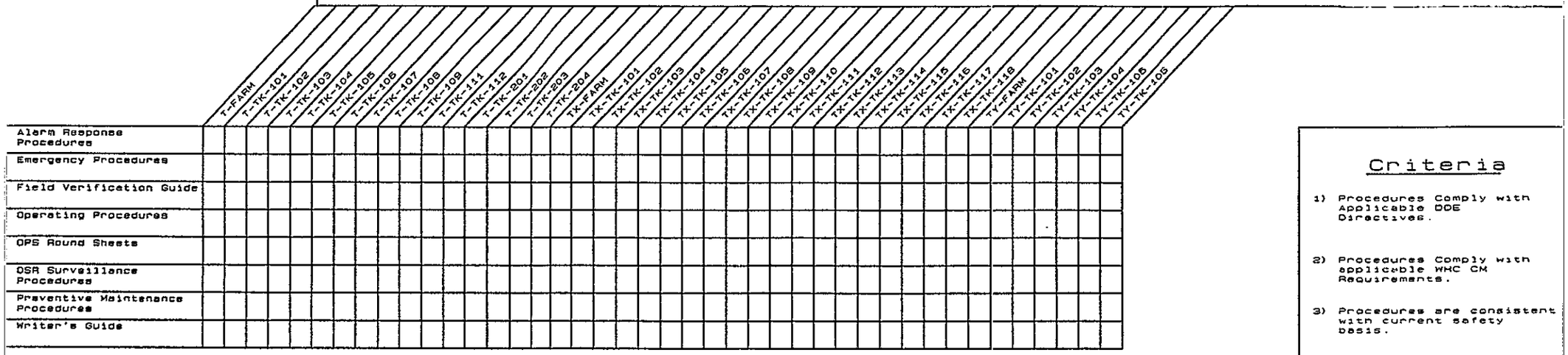
- Criteria Not Fulfilled
- Criteria Fulfilled
- Not Applicable
- Data Not Yet Compiled

Figure B-19
Single Shell Tanks (T-TX-TY)
Safety Documentation

01/22/93

TANK FARM CONDITION CHART

Project: Single Shell Tanks (T-TX-TY) **Group:** Procedures



Criteria

1) Procedures Comply with Applicable DOE Directives.

2) Procedures Comply with applicable WHC CM Requirements.

3) Procedures are consistent with current safety basis.

4) Procedures are consistent with current plant condition.

5) Training program is consistent with current procedures.

6) Workers are fully trained in procedures.

7) Procedures are fully implemented.

Criteria Not Fulfilled

Criteria Fulfilled

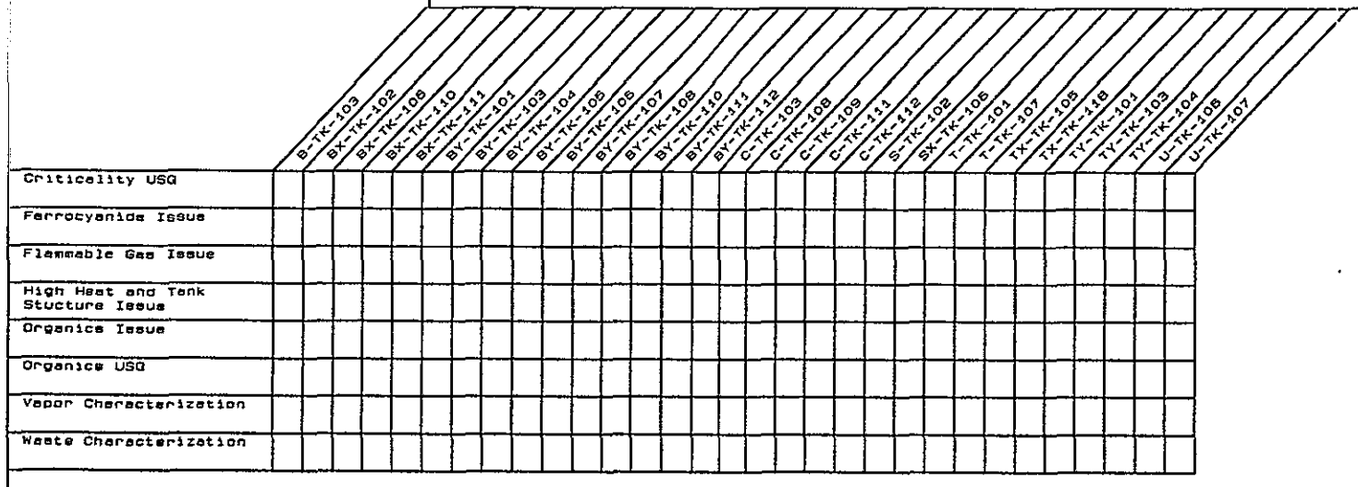
Not Applicable

Data Not Yet Compiled

Figure B-20
Single Shell Tanks (T-TX-TY)
Procedures

01/22/93

Project: Watch List Tanks (Ferrocyanide, Organic Salt) Group: Safety Issues



Criteria

1) (If a USQ) Ultimate resolution completed in accordance with DOE order 5480 21 and MRP 5.12.

2) Issue is resolved according to issue specific remediation plan.

3) Issue specific remediation plan has been developed and is being followed.

- Criteria Not Fulfilled
- Criteria Fulfilled
- Not Applicable
- Data Not Yet Compiled

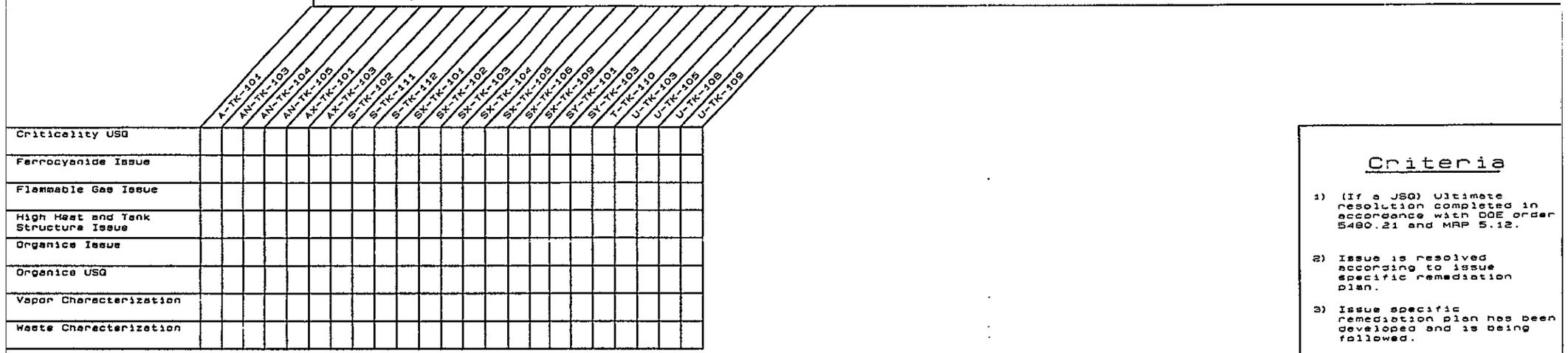
Figure B-21

Watch List Tanks (Ferrocyanide, Org
Safety Issues

01/25/93

TANK FARM CONDITION CHART

Project: Watch List Tanks (Flammable Gas, High Heat) **Group:** Safety Issues



Criteria

1) (If a USQ) Ultimate resolution completed in accordance with DOE order 5480.21 and MRP 5.12.

2) Issue is resolved according to issue specific remediation plan.

3) Issue specific remediation plan has been developed and is being followed.

- Criteria Not Fulfilled
- Criteria Fulfilled
- Not Applicable
- Data Not Yet Compiled

Figure B-22

Watch List Tanks (Flammable Gas, Hi
Safety Issues

01/25/93

APPENDIX C

MAJOR SYSTEM ACQUISITION AND SURVEILLANCE INSTRUMENTATION UPGRADE PROJECTS

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Table C-1. Tank Farm Restoration and Safe Operations Projects Proposed as a Major System Acquisition.

Action Plan	Project No.	Project Title	Estimated Cost ($M)
6.13	W-061	DST ventilation upgrade	55
6.8	W-188	Tank Farm radiological support facilities	31
6.9	W-199	200 East Area tank farms instrumentation system upgrade	66
6.9	W-200	200 West Area tank farms instrumentation upgrade	68
6.8/6.16	W-201	West Area transfer system upgrade	160
6.14	W-203	Tank Farms electrical upgrade	97
6.10	W-223	Tank Farm supervisory control and data acquisition	18
6.11	W-224	Local 200 Area network system	6
6.12	W-226	Centralized material control and maintenance facilities	11
6.9	W-228	Spectrol gamma analysis system	6
6.13	W-230	Hydrogen SST HVAC upgrades	323
6.18	W-XXA	Contamination zone reduction and ALARA Upgrade	24
NA	W-XXB	Contingency project	115
		Total	980

Table C-2. Tank Farm Proposed Surveillance Improvements Capital Projects - Fiscal Years 1993 and 1994.

Action Plan	Proposed Project Description	Estimated Cost ($M)
6.9	Liquid observation well--measure in-situ liquid	13.3
6.9	Surface-level monitoring	2.7
6.9	Temperature monitoring	22.8
6.9	Gamewell loop leak detection system	5.3
6.9	Differential tank pressure (vapor space vs. ambient)	8.0
6.9	Surveillance monitoring system	10.1
6.9	Flow, humidity, and temperature - ventilation exhaust monitors	3.0
6.9	Noxious fume monitoring	18.0
6.14	National Electric Code Upgrades - SST and DST	27.0
6.9	Hydrogen gas monitor on flammable gas tanks	9.4
6.10	TMACS for existing process-related instrumentation	5.2
6.10	Hand-held data acquisition	2.4
6.9	Drywell monitoring (case-by-case vs grid format)	118.1
6.9	Drywell van upgrades	1.4
6.9	New vadose zone and drywell van improvements	0.4
6.13	Ventilation upgrades DST and SST	175.0
6.11	DST integrity assessment	3.7
	Total Cost	**425.8**

APPENDIX D

UNFUNDED ENVIRONMENTAL COMPLIANCE ACTIVITIES AND PROJECTS

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DRAFT: REV. 3

ENVIRONMENTAL REGULATORY UNFUNDED COMPLIANCE ISSUES (-1

PROGRAM: TANK WASTE REMEDIATION SYSTEM

TIER	ISSUE (-2	OPER'G	C/E	FY 1993 UNFUNDED ($ 000)	CRITERIA RCRA	CRITERIA WAC	CRITERIA FED	PROGRAMMATIC IMPACT
1a	101-T Emergency Pumping & Preliminary Compliance Assessment	$4,344		$4,344	x	173-303-400	40 CFR 265.196	
1a	In-Tank SST Photography	500		500	x	173-303-400	40 CFR 265.193	
1a	Restore SX Laterals	100		100	x	173-303-400	40 CFR 265.193	
1a	Fully Fund Non-OSR Leak Detection Surveillances (PISCES)				x		40 CFR 265.195	
	Perform 242A PM/PISCES Program	450		450				
	Perform PMs/PISCES for Storage Facilities	750		750	x	173-303-300	40 CFR 265	
	Develop Env. Surv. Test program/procedures -- SST's			500	x	173-303-300	40 CFR 265	
1a	Surveillance Data Analysis	494			x	173-303-320	40 CFR 265.15	
	Complete Definition of Surv. Data Requirements			158	x	173-303-320	40 CFR 265.15	
	Data Trending & Review			500	x	173-303-320	40 CFR 265.15	
	Investigation of Surv. Annomailys & limited Corr. Action			494	x	173-303-320	40 CFR 265.15	
	Operator Roundsheets/Procedure Revisions			100	x	173-303-320	40 CFR 265.15	
	Increased surveillance Frequancy & Negotiate Associated Compliance Agreements			1500 *	x	173-303-320	40 CFR 265.15	

DRAFT: REV. 3

ENVIRONMENTAL REGULATORY UNFUNDED COMPLIANCE ISSUES (-1

PROGRAM: TANK WASTE REMEDIATION SYSTEM

TIER	ISSUE (-2	OPER'G	C/E	FY 1993 UNFUNDED ($ 000)	CRITERIA RCRA	WAC	FED	PROGRAMMATIC IMPACT
1a	Dome Elevation Surveys	50		50	x	173-303-320	40 CFR 265.15	
1a	Corrective Maintenance for Env.Compliance Act.				x	173-303-300	40 CFR 265	
	DST's Leak Detection			3000	x	173-303-300	40 CFR 265	
	Ventilation & Airborn Monitoring Equipment (Planning & Scheduling)			500	x	173-303-300	40 CFR 265	
1a	Compliance Assessment				x	173-303-300	40 CFR 265.193	
	Detailed Independent in-field Review			1000	x	173-303-300	40 CFR 265.193	
	Develop Corrective Action Plan			100	x	173-303-300	40 CFR 265.193	
	Implement Corrective Action			TBD	x	173-303-300	40 CFR 265.193	
1a	LOW Upgrades							
	Install LOW's in Priority SST'S			2500	x	173-303-400	40 CFR 265.193	
	Drywell Van LOW Dump Station Inst.			30	x	173-303-400	40 CFR 265.193	
1b	Sort, Repack, & Dispose of 2000 Haz. Waste Drums	2,100		2,100	x	173-303-630 173-303-200	40 CFR 262	
1b	Mod. 209E to provide for Sampl. & Pack. of New and Exist Wst	914		914	x	173-303-200	40 CFR 262	

DRAFT: REV. 3

ENVIRONMENTAL REGULATORY UNFUNDED COMPLIANCE ISSUES (-1

PROGRAM: TANK WASTE REMEDIATION SYSTEM

TIER	ISSUE (-2	OPER'G	C/E	FY 1993 UNFUNDED ($ 000)	CRITERIA RCRA	CRITERIA WAC	CRITERIA FED	PROGRAMMATIC IMPACT
1c	W-020H Construction Completion Cathodic Protection	105		320 **	x		40 CFR 265.191	
1c	Implement Revised CM/PM Priority System for Env. Equip.			350	x	173-303-370	40 CFR 265.15	
1c	Environmental Records Management for Tank Farms	158		316	x	173-303-380	40 CFR 265.73	
1c	Environmental Compliance Corrective Action Tracking System			200	x	173-303-380	40 CFR 265.73	
1c	WDOH Audit	1,000						
	Develop Plan & Schedules for WDOH Audit Funding			300				
	Corrective Actions			TBD				
1c	Respond to Regulatory Agency's Audits & Concerns			500				
1c	Dedicated Radio Trunk System	250		250	x	173-303-300	40 CFR 265	
	TOTAL	$11,215	$0	$21,826 + TBD's				

DRAFT: REV. 3
ENVIRONMENTAL REGULATORY UNFUNDED COMPLIANCE ISSUES (-1
PROGRAM: TANK WASTE REMEDIATION SYSTEM

TIER	ISSUE (-2	OPER'G	C/E	FY 1993 UNFUNDED ($ 000)	CRITERIA RCRA	CRITERIA WAC	CRITERIA FED	PROGRAMMATIC IMPACT

-1) IDENTIFIED ITEMS AND COST ESTIMATES PRELIMINARY

An assessment of compliance with (1) RCRA/WAC interim status requirements, (2) NESHAPs regulations, and (3) Underground Storage Tanks regulations was recently completed on 11/5/92. A corrective action plan for deficiencies identified in the assessment is targeted for completion on 12/1/92. Cost estimates for correcting deficiencies will be developed thereafter.

-2) NOT IN PRIORITY ORDER.

1a Adherence to the 357 Manual
1b Adherence to the Solid Waste Compliance Plan
1c Legal/Regulatory Items for which we can note the paragraph in which we are out of compliance
* 1.0M Capital Equipment
** Additional HEC Line Item funding of $500K is also required.

TWRSFC: 11/19/92: ENVCOMP6.WK3

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