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Federal Facility Agreement Contingency, Upgrade, and Replacement Plans for the ORNL Active Low-Level Radioactive Waste Tank System

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MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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ORNL/TM 11795

Chemical Technology Division

FEDERAL FACILITY AGREEMENT CONTINGENCY, UPGRADE AND REPLACEMENT PLANS FOR THE ORNL ACTIVE LOW LEVEL RADIOACTIVE WASTE TANK SYSTEM

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FEDERAL FACILITY AGREEMENT CONTINGENCY UPGRADE, AND REPLACEMENT PLANS FOR THE ORNL ACTIVE LOW LEVEL RADIOACTIVE WASTE TANK SYSTEM

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1 INTRODUCTION

The Superfund Amendment and Reauthorization Act (SARA) of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) required that the Department of Energy (DOE) execute a Federal Facilities Agreement (FFA) with the Environmental Protection Agency (EPA) within six months of final listing (December 21 1989) of the Oak Ridge Reservation on the National Priorities List (NPL) A draft agreement for Oak Ridge National Laboratory (ORNL) has been drawn up between DOE the Tennessee Department of Health and Environment (TDHE) and EPA that is expected to become effective in March 1991 The FFA for the Oak Ridge Reservation establishes new requirements for tank systems at ORNL This report summarizes the contingency upgrade and replacement plans that are being implemented at ORNL as a result of the FFA.

The liquid low level waste (LLLW) system at ORNL is comprised of extensive underground piping and collection/treatment/storage tanks Four categories of tank systems were established by the FFA (1) new or replacement tank systems (2) existing tank systems with secondary containment (3) existing tanks systems without secondary containment and (4) inactive tank systems This agreement states that all newly constructed LLLW tanks and associated piping must be doubly contained and must meet leak detection requirements Existing singly contained systems must pass leak tests and integrity assessments and have planned replacement plans in order to remain in interim operation Existing doubly contained systems that do not meet the new standards must be upgraded to meet the same requirements If any of these systems fail the leak detection tests or integrity assessments they must be repaired immediately or taken out of service

All singly contained systems that are known to leak (where leakage is defined as inleakage or leakage out of a tank system) must be either repaired or permanently removed from service

An FFA response plan was developed in December 1989 and is being implemented through a response team that requires multidisciplinary support from many ORNL organizations and divisions Primary activities include LLLW system definition development of FFA required documents assessments testing and demonstrations (ATD) for tank systems risk and alternative assessments and contingency and upgrade/replacement planning for the active tank systems This report focuses on the latter activity In this report contingency plans are defined as identification of and planning for alternate management of LLLW while replacement and upgrade projects are defined as projects that install systems to meet the full secondary containment and leak testing requirements of the FFA. Replacement and upgrade projects are being scheduled to bring the active portion of the LLLW system into full compliance with the FFA. Contingency plans for alternative waste treatment/transport are being developed for portions of the system that might otherwise be taken out of service before upgrades/replacements can be implemented This report summarizes the contingency and upgrade/replacement plans that have been developed for the active LLLW system The report describes the objectives of the program the existing LLLW system the generated LLLW and the contingency and upgrade/replacement plans The alternative methods considered for meeting the FFA are discussed and the selected plans are summarized by tank system and by generating divisions The proposed FFA budget and schedules are also summarized

2. PROGRAM OBJECTIVES

The ORNL LLLW tank systems were evaluated by the ORNL FFA response team against criteria such as degree of containment waste characteristics (toxicity and volume) tank system age degree of confidence in historical tank system data strategic importance to ORNL, etc These results are being used to establish priorities for scheduling leak tests

and determining if the systems meet the containment standards can be upgraded or must be replaced

Contingency and upgrade/replacement plans for the active LLLW system were developed based on the results of the system assessments described above Options being considered include (1) local or area collection and transport of waste to the central LLLW system (2) upgrades required to keep the systems in interim service (3) source treatment (4) waste reduction at the source (5) process relocation, and (6) program shutdown

The FFA contingency and upgrade/replacement plans were developed to meet the following objectives The upgraded LLLW system will be designed to meet the long term needs of ORNL R&D programs These plans will also be consistent with Waste Management program strategies and long range plans that is the FFA contingency and upgrade/replacement plans will implement upgrades required by the Waste Management upgrade strategy where possible These measures will minimize the amount of secondary waste that will be produced for ultimate disposal and produce acceptable waste forms such as class L-I and L-II solid low level waste forms and liquid waste that can be treated at the existing process liquid waste treatment facilities while minimizing the amount of LLLW transuranic (TRU) solid wastes and class L-IV solid waste forms

The contingency and upgrade/replacement plans were developed to minimize shutdown (temporary as well as long term) of active research and development (R&D) programs production programs and near term decontamination activities The plans do not provide LLLW service for long term (FY 1996+) decommissioning and decontamination activities in many cases

The FFA contingency and upgrade/replacement plans were also developed based on cost risk and expected regulatory response factor tradeoffs Cost factors that were considered included (1) implementing contingency and upgrade/replacement plans (2) programs and personnel (3) performing ATDs (4) project support required for the above activities (5) operating the systems and (6) transferring an inactivated system to the Environmental Restoration (ER) Program Risk factors examined in the planning activities include the potential environmental impacts due to shutdown of facilities and programs and as low as reasonably achievable (ALARA) personnel exposure considerations The expected regulatory responses were also taken into consideration as a

factor in planning that is the leeway that regulators were expected to allow in the interpretation of the FFA requirements and their responsiveness to adjusting requirements

The following assumptions were used in the development of contingency and upgrade/replacement plans for the active LLLW system Tank systems will be taken out of service (either temporarily or permanently) by either physically or administratively eliminating discharges of wastes from programmatic sources into the tank system Tanks removed from service will continue to collect nonprogrammatic wastes such as inleakage from vault seals wastes from floor drains and sumps and condensate collected in the gaseous ventilation systems during this period Tanks removed from service will also be used in the event of an emergency to collect and process LLLW It is assumed that tanks can be transferred to the ER Program without eliminating nonprogrammatic wastes and that ER is responsible for remediating all LLLW lines associated with a tank system

3 DESCRIPTION OF THE LIQUID LOW-LEVEL WASTE SYSTEM

The ORNL LLLW system is a complex assemblage of 98 tanks associated transfer pipelines and ancillary equipment designed to collect neutralize concentrate and store LLLW prior to disposal The FFA tank listing that has been submitted to DOE and the regulatory authorities is given in Table 1 Of these LLLW tanks 39 are inactive which means that they do not receive LLLW and are isolated physically or administratively from active waste generating facilities The FFA requirements for these tanks will be met through the ER Program and will not be covered in this report The remaining 59 tanks are owned by Waste Management or the generating divisions They are currently either active LLLW tanks or tanks that have been permanently removed from service and will be transferred to ER in the near future

The impact of the FFA to the active LLLW system is shown in Table 1 Eight tanks (W 1I 4501 C 4501 D 3002A, T 14 S-424 WC-4 and 4501 P) were removed from service prior to the FFA signing because they were no longer being used Ten tanks (W 12 W 17 W 18 WC 5 WC 6 WC 8 WC 11 WC 12 WC 13 and WC 14) will be removed from service when the FFA is signed because the tank systems are known or are

Table 1 ORNL liquid low-level waste tank systems listing

Existing tank systems with secondary containment						Existing tank systems without secondary containment that are removed from service			
Not requiring upgrades or replacements		Requiring upgrades or replacements		Existing tank system without secondary containment		Waste management inactive tanks		Environmental restoration inactive tanks	
Tank ID	Capacity (gal)	Tank ID	Capacity (gal)	Tank ID	Capacity (gal)	Tank ID	Capacity (gal)	Tank ID	Capacity (gal)
W 21	50 000	C 1	50 000	2026A	500	3002A	1 600	3001 B	75
W 22	50 000	C 2	50 000	WC 3	1 000	WC-4	1 700	3001-S	(NA)
W 23	50 000	N 71[b]	240	LA 104[b]	296	W 1I	500	3003 A	16 000
W 24	50 000	P 3[b]	197	WC 9	2,140	WC 5	1 000	3004 B	30
W 25	50 000	P-4[b]	197	WC 7	1 100	WC-6	500	3013	400
W 26	50 000	S 223[b]	2,500	F 201[b]	50	WC-8	1 000	WC 1	2,150
W 27	50 000	S 324[b]	1 000	F 501[b]	200	S-424[b]	500	TH-4	14 000
W 28	50 000	S 523[b]	1 000	HFIR	13 000	WC 11	4 600	TH 1	2,500
W 29	50 000	L 11	400	T 1	15 000	WC 12	1 000	TH 2	2,400
W 30	50 000	B 2 T[b]	1 870	T 2[c]	15 000	WC 13	1 000	TH 3	3 300
W 31	50 000	B 3 T[b]	1 870	WC 10[c,d]	2,300	WC 14	1 000	H 209	2,500
T 13	4 000	C-6 T[b]	700	WC 2[d]	1 000	4501-C[b]	100	W 19	2,250
		F 111[b]	125	WC 19[c]	2,250	4501 D[b]	100	W 20	2,250
		F 126[b]	1 200	W 16[d]	1 000	4501 P[b]	140	WC 15	1 000
		WC 20	10 000			T 14	48 500	WC 17	1 000
						W 12	700	T 30	825
						W 17	1 000	7560	1 000
						W 18	1 000	7562	12,000
								7503 A	11 000
								W 1	4 800
								W 13	2,000
								W 14	2,000
								W 15	2,000
								W 1A	4 000
								W 2	4 800
								W 3	42,500
								W-4	42,500
								T1	15 000
								T2	25 000
								T3	25 000
								T4	13 000
								T9	170 000
								W 10	1 500
								W 11	170 000
								W 5	1 500
								W-6	170 000
								W 7	170 000
								W-8	170 000
								W 9	170 000
TOTALS									
12 tanks		15 tanks		14 tanks		18 tanks		39 tanks	

[a]Tanks must be removed from service when the FFA becomes effective
[b]Generator-owned tanks.
[c]Tank systems will be used for decontamination activities in 1991 1994 and removed from service
[d]Tank systems to be used for collection of wastes for environmental, safety and health (ES&H) reasons only

suspected to leak (inleak or outleak) Tanks W 16 WC 10 and WC 2 will be used for near term decontamination activities (1991 1994) and will then be removed from service W 16 and WC 2 will not be replaced The W 21 through W 31 and T 13 tanks are expected to meet secondary containment standards without upgrades The remaining tank systems will be upgraded/replaced to comply with the new regulations Five tank systems (WC 10 WC 19, T 1 T 2 and HFIR) are being considered to be environmental, safety and health (ES&H) tank systems that cannot be shut down without creating unacceptable ES&H risks A justification for continued use of these systems must be determined by a risk assessment and is subject to regulatory approval Potential ES&H waste streams include those from regeneration of ion exchange columns at shutdown reactors decontamination of shutdown hot cells along with other decontamination activities for the Isotope Area Facilities and the Graphite Reactor Canal

Table 2 summarizes the facilities which have access to tank systems that will be operational after the FFA is signed These facility categories will be used throughout this report to describe tank system groupings

The LLLW Collection and Transfer (CAT) system was designed in the 1950s Most of the drains collection tanks and transfer lines in the system are singly contained The system was designed to work approximately 30 years however most of the system is more than 30 years old The locations of the active Bethel Valley tanks are shown in Fig 1 and the active Melton Valley tanks are shown in Fig 2

Radioactive liquids are discarded via hot drains located in laboratory sinks hoods floors and hot cells Waste that is discarded in this fashion flows by gravity to the collection tanks Each Waste Management owned collection tank is equipped with a sampling device liquid level instrumentation and a filtered vent to the atmosphere or to the off gas system of the facility that it serves Underground collection tanks in the Bethel Valley area have dry wells that are concrete pads with sumps located at the low point and wells extending to the surface of the ground A typical tank design is shown in Fig 3 A network of 0 05 and 0 08 m (2 and 3 in) stainless steel (SS) underground pipelines connect the collection tanks to one of two 0 15 m (6-in) doubly contained SS collection headers that directs the flow through doubly contained piping to the evaporator feed tank, W 22

Table 2. Facilities supported by active liquid low level waste tanks[a]

Facility	Tanks
3019	N 71 P 3 P 4
3517	S 223 S 324 S 523
Evaporator Complex	C 1 C 2 W 21 through W 31
3544	L-11
New Hydrofracture Facility	T 13
REDC[b]	B 2 T B 3 T C 6 T F 111 F 126 WC 20
3525	F 201 F 501
Isotopes Circle	WC 10 LA 104 WC 2
HFIR[c]	HFIR T 1 T 2
ORR[d]/BSR[e]/OGR[f]	WC 19
3025	WC 3
2533/3504	WC 7
HOG pot	WC 9
2026	2026A
3026D	W 16

[a]After the FFA is signed tanks WC 2 W 16 and WC 10 can only receive waste from decontamination activities for the Isotopes Facilities Shutdown

[b]REDC = Radiochemical Engineering Development Center

[c]HFIR = High Flux Isotope Reactor

[d]ORR = Oak Ridge Reactor

[e]BSR = Bulk Shielding Reactor

[f]OGR = Old Graphite Reactor

ORNL DWG 9 A 80

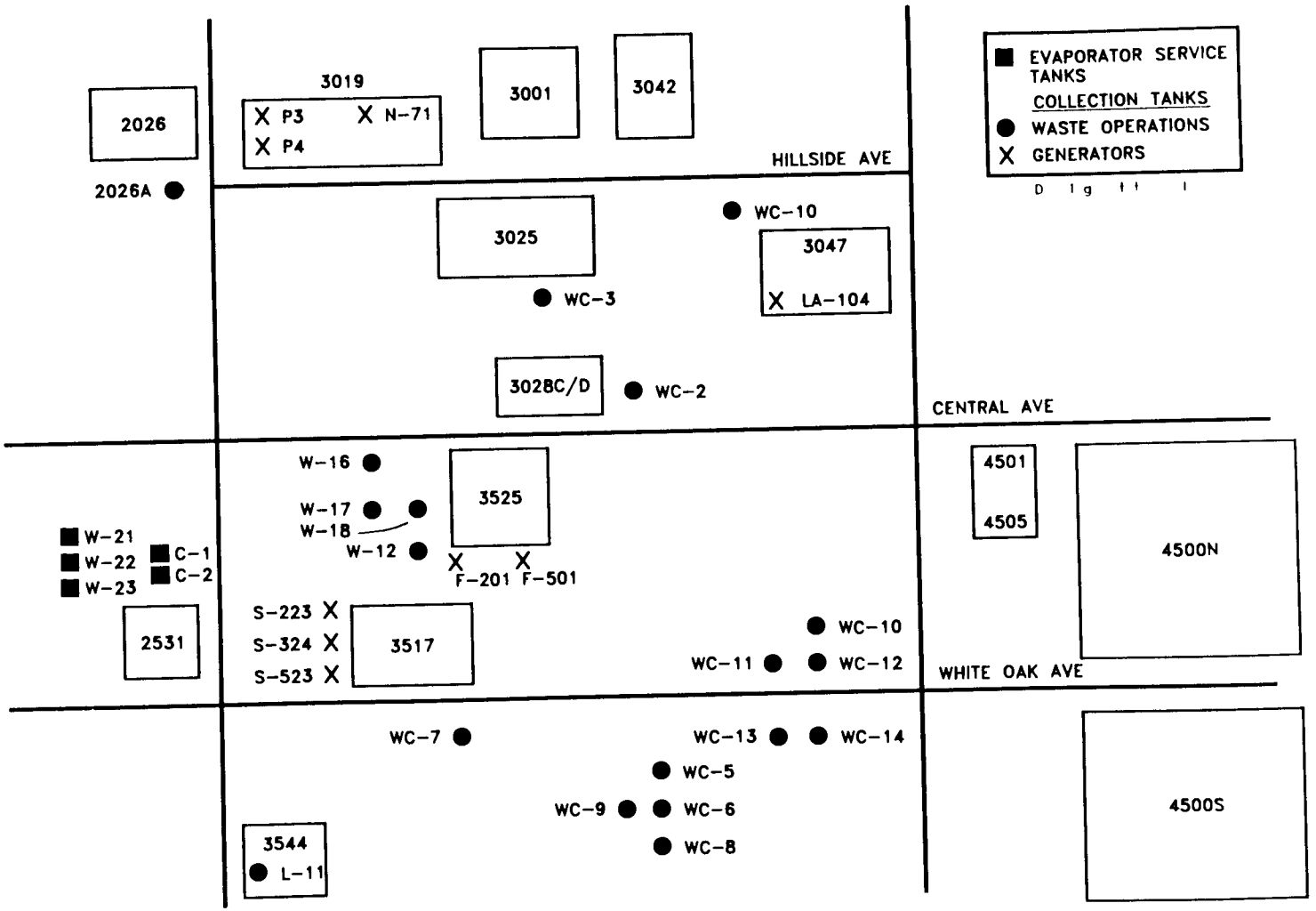

Fig 1 Bethel Valley liquid low level waste tanks

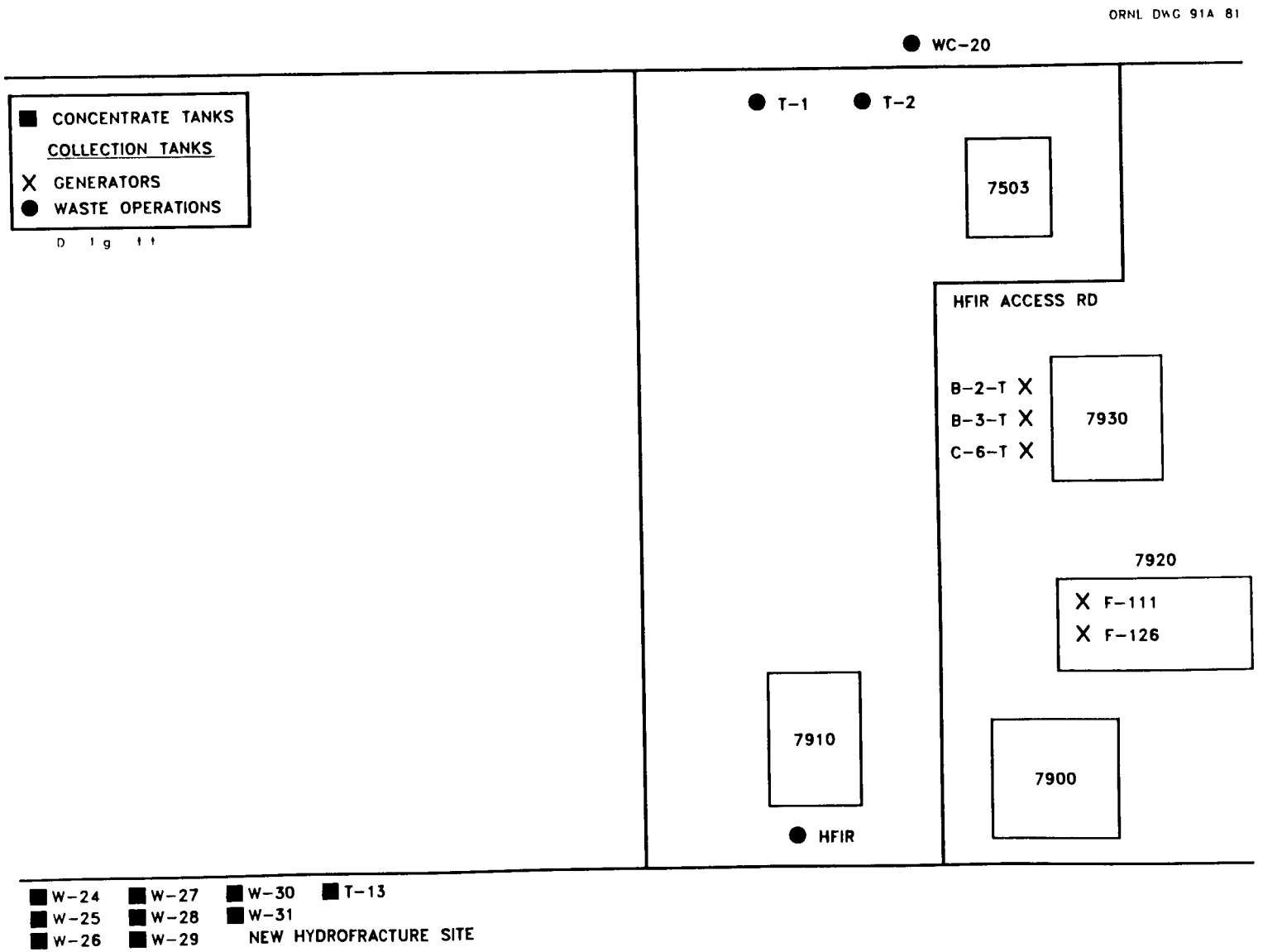

Fig 2. Melton Valley liquid low level waste tanks

ORNL DWG 88A-623R2

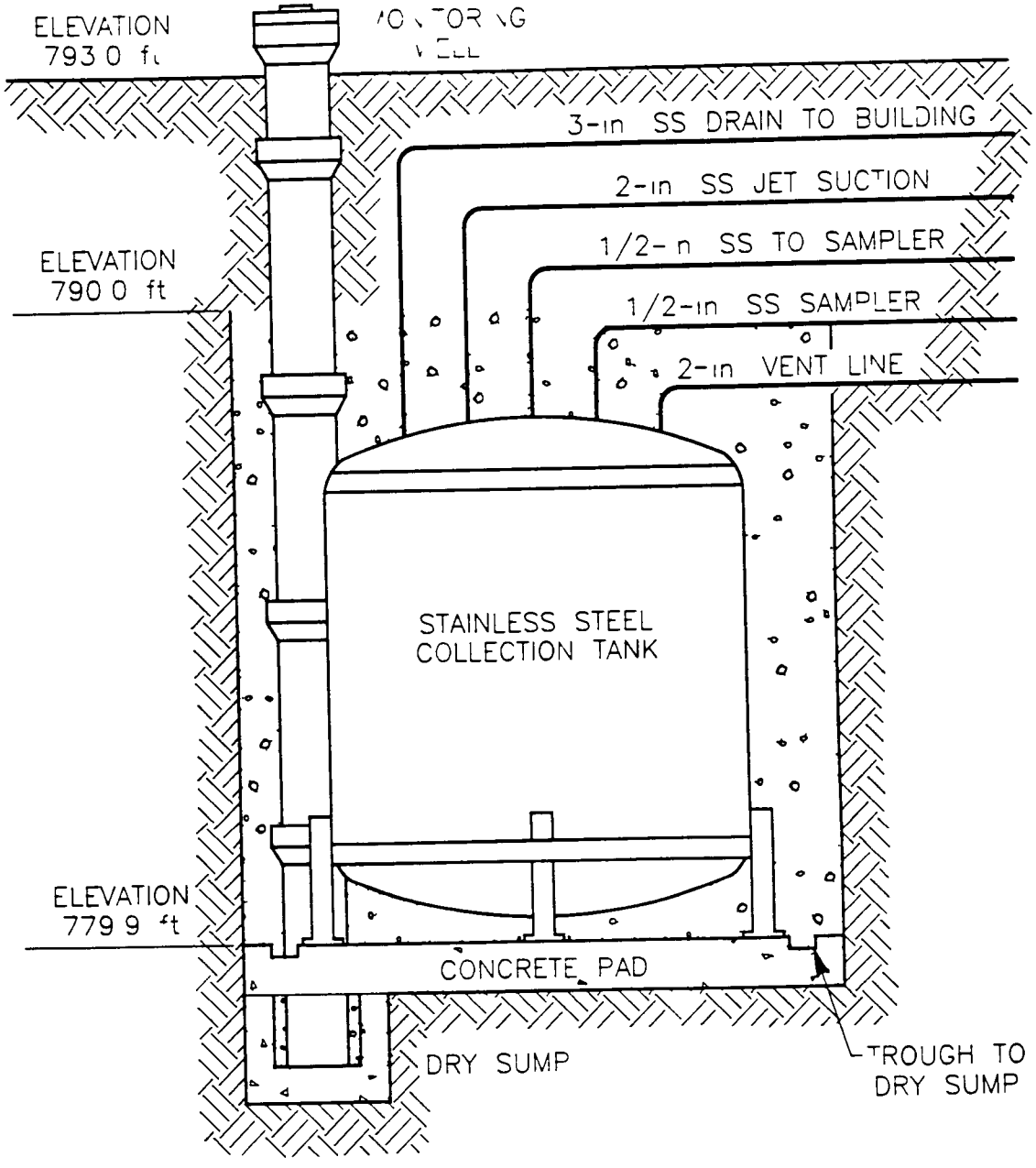

Fig 3 Typical vertical collection tanks

Several source buildings feed waste through generator collection tanks directly to the collection header without going through an LLLW collection tank Waste is transferred by centrifugal pump or steam jet from these sources

LLLW is accumulated in collection tanks (either generator or Waste Management owned tanks) and the volume accumulation in the Waste Management tanks are monitored continuously Table 3 summarizes the average monthly volumes accumulated in these tanks during 1989 and 1990 Estimated contributions due to nonprogrammatic generators are also given in the table Nonprogrammatic wastes (system inleakage waste from floor drains vault sumps filter pits the radioactive off gas system etc) are not affected by administrative controls and cannot be eliminated without major modifications to the existing systems The nonprogrammatic generation rates given in Table 3 are rough estimates based on the differences between programmatic generator estimates and measured tank volumes About 40% of the total LLLW collected is considered to be due to nonprogrammatic generators

The liquid collected in the tanks is transferred by steam jet or pump to tank W 22 the evaporator feed tank The contents of W 22 are then periodically transferred to the evaporators in a batch wise operation The waste is evaporated to a specific gravity of approximately 1 25 When this specific gravity is reached the concentrated waste is transferred by steam jet from the evaporator to tank W 23 and from there to 1 of the other 11 concentrate storage tanks [W 21 C 1 C 2 or W 24 through W 31 (Melton Valley storage tanks (MVST)] Table 4 lists the total volumes (sludge and liquid) in each of the LLLW concentrate storage tanks as of the end of October 1990

4 LIQUID LOW LEVEL WASTE GENERATORS

Several activities at ORNL contribute to the generation of LLLW Table 3 summarizes the volumes of dilute LLLW generated during 1989 and 1990 These data show the largest generators of dilute LLLW (in 1990) were the High Flux Isotopes Reactor (HFIR) W 1A, the 3039 Stack and Building 3026C The majority of the liquid waste accumulated from Building 3026C is due to inleakage to the tank system Tank W 1A is inactive and collects inleakage None of these activities contribute significantly to

Table 3. Liquid low-level waste collection tanks and average monthly collection volumes for 1989 and 1990

Collection tank	Tank conta ment	Generatung building( )	Monthly collection vol m (gal) 1989	1990	Estimated percentag of waste collected from nongenerator sources[d]
WC-10	single	3028, 3029 3030, 3031, 3033, 3038, 3110, 3047	1,065	590	40%
W 22[a]	in SS-lined vault	3039 stack	3 698	3,522	
WC-19	single	3001, 3002, 3003 3004, 3005 3006, 3042, 3109 3119	2,390	2,433	55%
W 1A[b]	single	none	4,067	3 884	100%
2026A		2026	81	113	
WC-11	si gle	4500N 4507	872	342	100%
WC-12	si gle	4505 4507	121	90	100%
WC-13	si gle	4500N 4500S, 4501, 4508	217	254	75%
WC-14	single	4501	68	70	50%
S-223 S-324, S-523	in surface coated-va lts	3517	1,324	979	40%
WC-8[c]	single	WC-8 pump pit	1,366	1,189	100%
WC-9	single	3503 hot off gas pump pit sump	382	881	100%
WC-5[c] & WC-6[c]	si gle	3508	283	344	100%
F 201, F 501, W 12[c]	W 12 is singly-contained F 201, 501 in l ned-vaults	3525	1,899	1,725	
W 22[a]	in SS-l ned va lt	3544 (d l te feed)	521	311	
F 111, F 126, B-2-T B-3-T C-6-T WC-20	in urface-coated va lts WC-20 is in SS-lined va lt	7920, 7930	992	1,066	
HFIR, T 1, T 2	si gle	7900, 7910	3 086	6,169	
WC-2	si gle	3028, 3038	39	20	
WC-7	si gle	3504	117	38	
W 16	si gle	3026D	139	28	
W 17 & W 18	si gle	3026C	3 003	2,635	95%
P 3 P-4, N 71	in SS-l ned cells	3019	76	95	
WC-3	si gle	3025	26	1	
TRUCKED		3074	123	109	
L-11	single	3544 (evaporator concentrate)	NA	NA	
T 13	lined va lt	New Hydrofracture Facility	NA	NA	
MISCELLANEOUS			169	0	
TOTALS			**26,124**	**26,880**	**40%**

[a]Tank W 22 is the feed tank for the evaporator Wastes listed bove for W 22 are transferred d rectly from generatung so rces without going through collection tank.

[b]W 1A is an inactive Environmental Restoration (ER) tank that collects rainwater and ground water inactive non-ER tank.

[d]Values are based on differences between generator estimates and tank measurements.

[e]Tank system is known to collect waste from vault sumps, filter pit sumps, building floor drains, etc.

Table 4 Liquid low level concentrate inventories in the active concentrate storage tanks

Concentrate tank	Tank containment	Volume of contents[a] (gal)
Evaporator service tanks		
W 21[b]	in SS lined vault	31 220
W 23	in SS lined vault	19,660
C 1	in unlined vault	20 210
C 2	in unlined vault	45 790
MVST		
W 24	in SS lined vault	44 880
W 25	in SS lined vault	44 020
W 26	in SS lined vault	41 340
W 27	in SS lined vault	44 700
W 28	in SS lined vault	44 800
W 29	in SS lined vault	46 670
W 30	in SS lined vault	46 420
W 31	in SS lined vault	45 620
TOTAL		475,330

[a]As of November 1 1990

[b]Tank W 21 receives LLLW concentrate primarily from the PWTP where the waste is concentrated prior to transfer to W 21

the volumetric generation of LLLW concentrate (evaporator effluent) In contrast a careful study of the major constituents (salts cleaners acids and bases) in the liquid waste has shown the largest contributors of LLLW concentrate to be the Process Waste Treatment Plant (PWTP) and the Radiochemical Engineering Development Center (REDC Bldgs 7920 and 7930) Table 5 summarizes the generation of LLLW concentrate by the various facilities as estimated based on information provided by the generators during 1989 and 1990

5 CONTINGENCY, UPGRADE, AND REPLACEMENT PLANS

Portions of the FFA are written in general terms and are thus open to interpretation Because of the uncertainty associated with the FFA requirements three cases were considered for implementing contingencies upgrades or replacements for the LLLW system to comply with the FFA. The first called the unconstrained resources case was developed to meet the EPA and TDHE s expectations as determined from the results of regular interface meetings over the last two years The second called the minimal resources case assumes that EPA and TDHE will allow ORNL some flexibility in the FFA requirements to reduce costs and shorten replacement schedules The third case, called the intermediate compliance case is a compromise between the first two cases

The unconstrained resources case assumes that the LLLW system would have to be leak tested by conventional methods in the FY 1991 to FY 1995 time frame and that most of the LLLW tank systems could either not be accessed to perform such tests or would not pass ATDs Alternative means of transporting or treating waste streams would have to be implemented to avoid shut down of facilities at the time ATDs were performed Permanent upgrades or replacements would be implemented by 2001

The minimal resources case assumes that certain requirements in the FFA could be relaxed to avoid extravagant near term costs associated with system tests and contingency measures that do not support long term upgrades Under these conditions contingency plans would only be implemented for leaking tank systems that will be taken out of service when the FFA becomes effective It is assumed that all other tank systems could

Table 5 Calculated generation rates of liquid low level waste concentrate

Tank and/or source building	1989 LLLW concentrate generation rate (gal/year)	1990 LLLW concentrate generation rate (gal/year)	1989 Percent contribution	1990 Percent contribution
WC 20 (REDC)	4 700	4 700	30	38
PWTP Feed	2 250	900	46	38
PWTP Concentrate	3 700	3,800		
Bldg 3517	850[a]	100[b]	6	< 1
W 12 (Bldg 3525)	650	750	5	6
WC 19 (ORR BSR)	550	500	4	4
HFIR	250[b]	1 200[a]	2	10
WC 10 (Isotopes)	150	50	1	< 1
Others	700	500	6	4
TOTAL	13 100[c]	12,500[d]		

[a]Estimate based on information obtained during operation
[b]Estimate based on information obtained during shutdown
[c]Actual concentrate generation during 1989 was 13 400 gal (including some concentrate generated early in 1990)
[d]Actual concentrate generation through October 1990 was 12 600 gal

be utilized in their present condition until upgrade/replacement projects could be implemented

The intermediate compliance case assumes that state-of the art nondestructive leak tests can be performed on the tank systems These methods which have not yet been determined or demonstrated are expected to cost less take less time and reduce personnel exposure as compared to conventional test methods that would require installation of valves in many difficult to access tank systems This scenario assumes that many systems would fail ATDs and would not be allowed to remain in service until upgrades/replacements could be implemented However only a limited amount of funding would be provided to implement contingency planning for the most vulnerable systems

The unconstrained resources case is viewed as the most feasible case for meeting anticipated regulatory expectations but results in inefficient use of limited resources However this case is also the safest in terms of maintaining continuity of operations at ORNL The minimal resources case requires major concessions from regulators with regard to diminished leak testing but allows more efficient use of resources because efforts are only focused in upgrading and replacing portions of the system to meet the FFA requirements Unfortunately unless regulatory agreement is obtained this scenario also leaves the waste generators in a much more vulnerable situation since all contingency plans have been dropped except those for systems that will be taken out of service when the FFA becomes effective The intermediate compliance case attempts to meet the anticipated regulatory expectations by using state of the art leak testing methods but eliminates contingency options for most systems because of budget and timing restrictions This case also leaves the waste generators in a vulnerable situation because many leaks are likely to be found when the tests are performed The present budget does not provide funding for implementing alternative treatment options at most facilities The intermediate compliance case has been chosen for submission to TDHE and EPA as part of the FFA deliverables The details of this decision will be described in Sect 6

The contingency upgrade and replacement plans for each of the three cases are summarized in Sect 5 1 by tank systems The associated LLLW tanks are listed in parentheses A brief description of the tank systems and their usage is given The unconstrained resources case plan for meeting the FFA is then described in detail for each system The differences between the unconstrained resources minimal resources and

intermediate compliance cases are noted after the description of the unconstrained resources case The intermediate compliance case is then described in Sect 5 2 by generating division

5 1 CONTINGENCY AND UPGRADE/REPLACEMENT PLANS SUMMARIZED BY TANK SYSTEM

5 1 1 4500 Area Buildings (Tanks 4501-C, 4501-D, WC-11, WC-12, WC-13 and WC-14)

The 4500 area is made up of nine buildings in which a wide variety of research is performed Most activities are limited to small laboratory scale operations and are short term in nature Typical examples of programs in this area include fission product release studies for light water reactor fuel fuel reprocessing studies radioactive waste treatment studies and chemical analyses

The LLLW tanks that serve the 4500 area are singly contained tanks Tanks 4501 C and 4501 D are located in Building 4501 They have not been used for several years are disconnected from the LLLW system and have no prospects for future use Tanks WC 11 WC 12 WC 13 and WC 14 are located in the WC 10 tank farm and discharge to the central LLLW system via the WC 10 tank farm discharge line Pressure tests indicate that this line may leak Therefore these tanks will be taken out of service when the FFA becomes effective Programmatic waste generated in these areas will be discontinued at that time Nonprogrammatic waste will be eliminated before the tanks are turned over to ER if possible

Unconstrained Resources Case. Since direct access to the LLLW system will not be available in the 4500 area after the FFA is signed alternative transport/treatment methods are required to support R&D activities that generate small volumes of LLLW in the Analytical Chemistry Chemical Technology Chemistry and Metals and Ceramics Divisions Temporary bottling stations will be installed in FY 1991 on expense funding Pretreatment of waste at the source will be required to meet bottling waste acceptance criteria in some cases The bottling stations will be upgraded as necessary for permanent use on a FY 1992 general plant project (GPP) entitled 4500 Area LLW Upgrade

(WBS 3 96) An FY 1995 line item entitled Bethel Valley FFA Upgrades (WBS 3 04) will replace the LLLW system for Building 4501

Waste from nonprogrammatic sources will be collected in the existing LLLW tanks until they can be diverted from the LLLW system or remediated The known nonprogrammatic waste streams from the 4500 area include the 4501 floor sumps that can discharge to WC 13 inleakage to the inactive (ER program) tank T 30 sump (Building 4507) that discharges to WC 12 and 4556 filter pit which discharges to WC 11 It is assumed that WC 11 and WC 12 can be turned over to the ER program without addressing the releases by T 30 or 4556 The 4501 and 4505 floor sumps presently have lines that discharge to LLLW the Nonradiological Process Waste Treatment Plant or the storm drains An FY 1993 GPP entitled Pipeline Additions for FFA (WBS 3 16) will divert the 4501 4505 and 4508 floor sumps to the PWTP and cap the LLLW lines This project will be operational in FY 1996

Minimal Resources Case. Same as the unconstrained resources case

Intermediate Compliance Case. Same as the unconstrained resources case

5 1.2 Building 3019 (Tanks N 71 P-3 and P-4)

This facility serves as the national repository for U 233 and houses several miscellaneous research projects that require direct LLLW system access The tanks are doubly contained have level monitors and are visibly inspectable They are located in hot cells with SS liners that will hold the entire contents of the tanks Visible inspection will be adequate to pass ATDs Waste from tanks presently discharges from the building through a singly contained line that must be upgraded to meet the FFA standards

Unconstrained Resources Case. A FY 1992 GPP entitled FFA Compliance Work I (WBS 3 28) will replace the LLLW piping from the building to the central LLLW system It is assumed that most of the system will meet secondary containment requirements and ATDs will not be performed on the external piping of the building until it is replaced Therefore no contingency plans are required

Minimal Resources Case Same as the unconstrained resources case

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WBS = Work breakdown structure project identification number

Intermediate Compliance Case. Same as the unconstrained resources case

5 1.3 Building 3517 (Tanks S-223 S-324, S-523, and S-424)

Building 3517 has been primarily used for isotopes production activities In the future it will be used for isotopes storage and possibly for Waste Management research activities The tanks serving this facility are located in underground tank vaults (also called cells or pits) outside the building and the tanks are also not known to leak. Lines in the building are encased in concrete and are not known to leak. The drainage lines from the building to the tanks are in the lined tank vault These vaults serve as secondary containment for the lines since any leakage of the lines would drain to the floor of the vault The vaults serve as leak detection for the tanks and lines but the vault that houses tank S 223 also collects inleakage There is a short (~ 3 ft) section of singly contained line that connects the tank vault to a doubly contained line which is connected to the central collection system at valve box 2A. This line has valves in place so that it is pressure testable from the valve box just inside the tank vault to valve box 2A.

Tank S-424 is an inactive tank that will be transferred to ER in the near future The three remaining tanks are active LLLW tanks that will be used for decontamination purposes in FY 1993 and 1994 as described in the Isotope Facilities Shutdown Plan (IFSP) The tanks will then be used to transfer waste generated by isotopes storage and transfer operations and possibly for future Waste Management programs

Unconstrained Resources Case. A FY 1994 line item entitled Bethel Valley FFA Upgrades (WBS 3 31) will replace the LLLW system per the design done as part of the Bethel Valley CAT System Upgrade line item (WBS 3 37) This replacement of the LLLW tank system will meet FFA requirements and is expected to be operational in FY 2001 The pressure testability of the existing LLLW lines is questionable because the radiation level in the area may not allow access to the lines Therefore contingency measures will be put in place to ensure that the system can be used until the line item upgrades become operational A temporary decontamination system with waste treatment systems that do not require direct LLLW system access will be installed beside Building

3517 to support IFSP This system must be developed demonstrated and constructed on expense funding for use during implementation of the IFSP

Minimal Resources Case This case assumes that no ATDs will be performed on the existing LLLW system since existing levels of secondary containment and leak detection are adequate It can be used without upgrades until the system is replaced The contingency plans for development and installation of the temporary decontamination system will be dropped Line item upgrades will be continued to support ongoing isotopes storage and transfer operations and for future programs being considered for the facility

Intermediate Compliance Case. This case assumes that much of the system meets secondary containment requirements and that the remainder can be successfully leak tested by state of the art methods until the system is replaced Therefore the contingency plans for the tank system will be dropped

5 1 4 Building 3525 (Tanks F-201, F-501, and W-12)

Tanks F 201 and F 501 collect waste from various nuclear fuels and target projects performed in Building 3525 primarily for the Metals and Ceramics Research Reactors and Chemical Technology Divisions Tank F 201 also collects waste from the 3525 basement sump These tanks discharge into Tank W 12 which is connected to the central LLLW system W 12 also collects inleakage from the inactive (ER program) W 19 and W 20 tank sumps Tank F 501 is in an underground vault which serves as secondary containment Tank F 201 is a SS tank in an off gas filter pit W 12 is a singly contained tank located in the vicinity of the South Tank Farm The flange in the discharge line from W 12 to the central LLLW system is known to leak and cannot be repaired because of the high radiation field in the area Therefore W 12 will be taken out of service when the FFA becomes effective Tanks F 201 and F 501 will be kept in service until they are replaced

Unconstrained Resources Case. Since W 12 will be removed from service alternative methods for transfer from F 201 and F 501 to the central LLLW system must be implemented until the entire LLLW system can be replaced Contingency plans will be implemented for interim transfer of waste in two phases (1) FY 1990 and 1991 expense funds will be used to perform piping modifications at F 501 to allow trucking of waste

using Waste Management s existing tanker truck and (2) doubly contained piping will be installed to bypass W 12 from F 501 to the central LLLW system through a FY 1992 GPP entitled FFA Compliance Work I (WBS 3 28) The FY 1994 line item entitled Bethel Valley FFA Upgrade I (WBS 3 31) will replace the LLLW system for the building per the Bethel Valley CAT System Upgrade line item design (WBS 3 37) W 12 will be taken out of service when the FFA becomes effective However inleakage that is jetted to W 12 from the W 19 and W 20 tank vaults currently cannot be transferred to W 12 due to a faulty steam jet A work request has been issued to repair the jet on generator expense funding Generator plans are to turn the tanks and tank vault over to ER without additional upgrades once the steam jet is repaired It is assumed that W 19 and W 20 inleakage can be transferred to the central LLLW system via W 12 until the waste is diverted to the process waste system on an FY 1994+ GPP or until the systems are remediated under the FFA schedule for inactive tanks if the radioactivity in the waste is too high to permit diversion to the process waste system

Minimal Resources Case. Same as the unconstrained resources case

Intermediate Compliance Case. Same as the unconstrained resources case

5 1.5 Isotopes Circle Buildings (Tanks LA-104 W-1I, W 17 W 18, WC-2, WC-10 and the 3092 Scrubber Transfer Lines)

These facilities are mainly used for radioisotopes production and storage All tanks except LA 104 are singly contained tanks Tank LA 104 is located inside Building 3047 and is visually inspectable W 1I is located under Building 3028 and has not been used for several years There are no future prospects for use of this tank therefore it will be removed from service Tanks W 17 and W 18 located in the vicinity of the South Tank Farm receive waste from Health and Safety Research Division (H&SRD) programs in Building 3026C and inleakage but will be taken out of service when the FFA becomes effective The WC 2 tank is located west of Building 3030 and collects waste from the Isotopes Buildings 3028W and 3038W The waste from the 3092 Hot Off Gas (HOG) Scrubber Facility enters the LLLW system downstream of WC 2 The tank and lines are not known to leak. WC 10 is located in the WC 10 Tank Farm and collects waste from Buildings 3028E 3029 3030 3031 3032 3033 3033A, 3038E 3047 3093 and 3118 This tank is not known to leak however, the lines between the WC 10 tank farm and the

central LLLW system may leak (see discussion for 4500 area buildings) The lines from Buildings 3028E and possibly 3038E to WC 10 are known to leak

Tanks WC 2 and WC 10 are needed for safe shutdown by the IFSP in FY 1991 1994 Long term LLLW service is needed for R&D activities planned for the unique hot cell facilities in Building 3047. The building has many unique capabilities in terms of hot cell entry that enable accepting and handling various carriers (i e transferring from top loading to bottom loading carriers) This diversity is not available at other ORNL facilities A conveyor system that allows transfer of material and equipment between cell banks without opening the cells is available Manipulator hot cells alpha handling cells beta gamma handling facilities and ventilated sinks and hoods are contained in this facility In the event of an accident Building 3047 also has a hot shower for decontamination of personnel These unique facilities will require that 3047 be kept in operation for future projects that might be located in the building as well as to support programs located in other ORNL buildings

Unconstrained Resources Case. Tanks W 17 and W 18 will be removed from service when the FFA becomes effective The H&SRD programs in the Isotopes Area will be moved to Building 3047 Two hot cells will be installed in Building 3047 to accommodate these projects These hot cells are expected to reduce LLLW generation and any LLLW generated by work in these cells will be bottled Five bottling stations will be installed for these and other H&SRD activities on a FY 1992 GPP entitled 3000 Area LLW Upgrade (WBS 3 02) If the work performed in Building 3026C should continue a bottling station will be installed

The IFSP calls for decontamination of the facilities in Isotopes Circle using WC 2 and WC 10 Direct LLLW system access is likely be to needed for decontamination purposes through 1994 WC 2 will be used as is until IFSP is completed The tank will then be taken out of service Lines downstream of WC 2 that transfer 3092 scrubber waste solutions to the LLLW system will be used as is until the line item entitled Bethel Valley CAT System Upgrade (WBS 3 37) replaces it with doubly contained pipe A temporary decontamination system with waste treatment systems that do not require direct LLLW system access will be developed and installed to support the IFSP Contingency plans for Bldgs 3028 3029 3038E and 3038 AHF also include installation of bottling stations in FY 1991 using expense funds for IFSP

Ongoing projects in Building 3047 will require a long term access to the central LLLW system FY 1991 expense funds will be used to perform piping modifications at LA 104 to allow trucking of waste using Waste Management s existing tanker truck. The trucking station will be upgraded for long term use on a FY 1992 GPP entitled Building 3047 Trucking Station (WBS 3 03) A FY 1995 line item entitled Bethel Valley FFA Upgrade II (WBS 3 04) will replace the LLLW system for the building

Minimal Resources Case. This case assumes that the existing LLLW system can be used temporarily without upgrades for IFSP (i e as an ES&H system) The contingency plans for development and installation of the temporary decontamination systems and bottling stations for IFSP are dropped Contingency plans and long term upgrades for the Building 3047 LLLW system are kept

Intermediate Compliance Case. Same as the minimal resources case

5 1 6 Evaporator Complex (Tanks C-1 C-2, and W-21 through W-31)

These tanks are needed to operate the central LLLW evaporator system All tanks are secondarily contained however, the vault containing C 1 and C 2 is not lined

Unconstrained Resources Case. It is assumed that these tanks can be used without upgrades Contingency plans for these tanks are to upgrade with expense funding as necessary to eliminate leaks C 1 and C 2 will be taken out of service as soon as the Waste Handling and Packaging Plant (FY 1994 line item project) processes enough of the LLLW inventory in the MVST to allow the tanks to be emptied

Minimal Resources Case. Same as the unconstrained resources case

Intermediate Compliance Case. Same as the unconstrained resources case

5 1 7 Building 3544 (Tank L-11)

The PWTP (Building 3544) is needed to treat slightly contaminated process wastewater including the LLLW evaporator overheads L-11 is a singly contained above ground tank that is visually inspectable The piping to the central LLLW system is singly contained but can be pressure tested

Unconstrained Resources Case. An FY 1992 Martin Marietta Energy Systems (Energy Systems) Central Waste Management line item (WBS 1 1 4 1) will install a Class L-I Landfill Leachate Waste Decontamination Facility for the ORNL PWTP that will implement upgrades to eliminate LLLW generation at the facility Contingency plans include installation of an SS pan under L-11 on an FY 1992 GPP entitled 3544 IE/E Room Upgrade (WBS 3 78), replacement of the LLLW transfer line from L-11 to the central system on a FY 1994 GPP entitled L-11 Discharge Line for LLLW" (WBS 3 29) and installation of a trucking station on expense funds if the system develops a leak before LLLW lines can be replaced

Minimal Resources Case. It is assumed that the existing LLLW lines can be used without upgrades until LLLW generation ceases (projected schedule is FY 1997) The LLLW line replacement and trucking station contingency plans are dropped

Intermediate Compliance Case. Same as the minimal resources case

5 1.8 High Flux Isotope Reactor (HFIR Tank, T-1 and T-2)

The HFIR is used for nuclear research and to produce transuranic isotopes The tank system that serves this facility consists of three singly contained tanks and associated piping It is not known to leak The tanks receive waste from the HFIR associated research and development laboratories the off gas stack from Building 7911 and filter pit wastes from Buildings 7913 and 7920

Unconstrained Resources Case. The FY 1992 line item entitled Melton Valley CAT System Upgrade (WBS 3 45) is scheduled to replace the entire LLLW system in the HFIR area The system is being considered for designation as an ES&H system in case it develops a leak during the interim period Unfortunately the reactor would have to be shut down to warrant the ES&H status Therefore contingency plans will implement alternative treatment/disposal methods by FY 1992 to avoid possible shutdown of HFIR when ATDs are performed The contingency plan for Building 7900 calls for installing an ion exchange system to treat laboratory waste and waste from the sample sink to produce process waste The loaded resins from this ion-exchange system and the six reactor ion-exchange columns will be disposed of as solid waste (rather than regenerating the columns to produce LLLW as in the present process) Upgrades include installing lines to

sluice resins out of the ion exchange columns into shielded containers installing a dewatering station and installing a transfer station to prepare the resins for shipment and disposal as a solid waste The stack drainage from Building 7911 and filter pit waste would be diverted to process waste after decontamination and upgrades of the filter system These activities will be accomplished using expense funding

Minimal Resources Case. It is assumed that the existing LLLW system can be used without upgrades until the Melton Valley Line Item can replace the existing LLLW system To make the scope of the Melton Valley Line Item consistent with the long term LLLW management strategy, the Melton Valley Line Item will install on site treatment to produce solid waste and process wastewater instead of installing new LLLW tanks and lines

Intermediate Compliance Case. It is assumed that the existing LLLW system can be used without upgrades as an ES&H system However this would require that the HFIR be shut down if the system fails ATDs Therefore the plans are to continue the unconstrained resources case contingency plans to install a treatment system at the source to eliminate LLLW generation A system to dispose of resin as a solid waste will be installed on FY 1990 92 expense funding The laboratory waste treatment system and resin dewatering/disposal system will be installed by an FY 1992 project entitled HFIR LLLW System Upgrade (WBS 3 01) and an FY 1993 project entitled LLW Treatment Alternatives (WBS 3 35) The stack drainage and filter pit waste will be diverted to process waste using an FY 1994+ GPP The Melton Valley Line Item will replace the LLLW system

5 1 9 Radiochemical Engineering Development Center (Tanks F 111 F-126 B-2-T C-6-T B-3-T, and WC-20)

This facility processes HFIR targets for the recovery of californium and other transuranic isotopes REDC produces the largest volumes and most radioactive waste of the LLLW generators

Buildings 7920 and 7930 each have a lined concrete vault (secondary containment) holding the building liquid waste tanks (7920 has tanks F 111 and F 126 7930 has tanks B 2 T B 3 T and C 6 T) The vaults have monitored and alarmed sumps for leak

detection and secondary containment Lines running from Building 7930 processing areas (hot cells etc) to the 7930 waste vault and tanks C-6 T B 2 T and B 3 T do not have the valving necessary to conduct pressure tests In addition some of the piping is arrayed in a complex network. Although there is evidence that the system does not leak this evidence may not be acceptable for ATDs under the FFA. (The small amount of liquid collected in the tank pit sump which results from rainfall entering through the top of the pit is sent to the Process Waste System where a radiation detector can divert the stream to the LLLW if it is found to be radioactive Such a diversion has never occurred which consequently supports a conclusion that no leakage has occurred either from the tanks or their associated lines)

The 7920 waste tank vault is located inside the building Waste tanks and lines to be scrutinized under the FFA are contained in this vault which has a lined monitored and alarmed sump serving as leak detection and secondary containment for the tanks and some piping Several transfer lines are contained in other areas such as the cubicle 7 vault the pipe tunnel and the tank vault 7 All of the waste vaults have lined monitored and alarmed sumps for leak detection Monitoring of these sumps indicates no leakage One singly contained waste drainage line passes through a 4 5 ft thick concrete shielding wall between the waste tank vault and the pipe tunnel and cannot be pressure tested

Waste is transferred from both waste tank vaults to tank WC 20 which is a doubly contained lined vault The line from the waste vaults to the valve box outside the WC 20 vault is tested routinely and has not leaked

Unconstrained Resources Case. The LLLW system for REDC will be replaced on the Melton Valley CAT System Upgrade line item (WBS 3 45) Contingency plans call for the development of processes for treatment at the source by FY 1992 to avoid shut down of the REDC in the event that the tank system fails ATDs The LLLW streams from these facilities must be handled remotely because of the high levels of radioactivity and the operating volumes generated at 7920 are greater than 1000 gal/month making alternative collection/transport options such as trucking very difficult Developmental studies are focusing on on site treatment of waste (1) segregation and solidification of TRU waste (2) segregation of beta/gamma containing waste (3) elimination of nonradioactive salts in the off gas scrubber system and (4) recycle of solvents The purpose of the development efforts is to produce a flow sheet that will produce only solid

waste and LLLW which can be trucked until the Melton Valley Line Item replaces the LLLW system These actions would also meet the long term LLLW management strategy objectives to segregate TRU waste at the source reduce the amount of nonradioactive salts entering the LLLW system and reduce the generation rate for LLLW concentrate

Minimal Resources Case. It is assumed that the existing LLLW system can be used without upgrades until the Melton Valley Line Item can replace the existing LLLW system To make the scope of the Melton Valley Line Item consistent with the long term LLLW management strategy the Melton Valley Line Item will install on site treatment to produce solid waste and process wastewater instead of installing new LLLW tanks and lines This alternative is considered to be extremely risky since it does not provide alternative means of treating/disposing of LLLW if REDC should fail ATDs before the line item becomes operational and because much research will be required to demonstrate that treated REDC waste can meet the PWTP waste acceptance criteria

Intermediate Compliance Case. Plans are to continue with research needed for the unconstrained compliance case contingency plans on an extended schedule Contingency measures will be installed that will allow REDC to meet the LLLW trucking waste acceptance criteria (if needed) and will also meet the long term LLLW management strategy objectives described above The Melton Valley Line Item will be rescoped as necessary to accommodate these changes

5 1 10 Oak Ridge Reactor/Bulk Shielding Reactor/Old Graphite Reactor (Tank WC-19)

Three nuclear reactors primarily used for research are serviced by tank WC 19 which is a singly contained LLLW tank located southeast of Building 3042 It collects waste from the Oak Ridge Research Reactor (ORR) the Bulk Shielding Reactor (BSR) the Old Graphite Reactor (OGR) the 3109 off gas and 3139 cell ventilation filter pits and the 3002 filter house (transferred to WC 19 through 3002A, which is an inactive tank) The tank is needed to support the closure plan for the OGR pool leak and is needed to receive ion exchange regenerant from the reactors The OGR demineralizers will be shut down after the interim closure of the canal has been completed in FY 1991 The ORR and BSR are currently shut down but the BSR could restart as early as FY 1992

Unconstrained Resources Case. It is assumed that WC 19 qualifies for ES&H status This will allow use of WC 19 for the OGR canal closure and for temporary collection of the ORR and BSR reactor ion exchange column regenerant produced when the reactors are not in operation An FY 1992 GPP entitled ORR/BSR LLW Upgrade (WBS 3 79) will install alternative treatment options for these waste streams The GPP will divert the pool overflows and floor drains to the process waste system The ion-exchange columns for the BSR will be replaced with a system that will allow direct disposal of the loaded resins as a solid waste (as opposed to regeneration of the columns to produce LLLW in the present process) for treatment of the pool water This GPP will totally eliminate LLLW generation at the ORR and BSR A temporary trucking station will be installed on expense funding to allow interim transport of the ion exchange regenerant to the central collection system when the BSR is operating

It is assumed that WC 19 can be used for the OGR canal closure without any upgrades because of the ES&H exemption No contingency plans will be implemented for the OGR

The 3109 off gas and 3139 cell ventilation filter pits will be enclosed on an out year GPP The LLLW lines from these filter pits will also be capped and the waste diverted to process waste by this GPP It is assumed that WC 19 can be transferred to the ER program without eliminating the 3002 filter housing waste

Minimal Resources Case It is assumed that if the BSR starts up before FY 1994 the Research Reactors Division will provide alternative treatment/collection methods and the temporary trucking station can be deleted

Intermediate Compliance Case. Same as the minimal resources case

5 1 11 Building 3025 (Tank WC-3)

Physical properties analyses are performed on irradiated metal samples in the Irradiated Materials Examination and Testing Facility that is serviced by Tank WC 3 a singly contained tank which is located south of Building 3025 It is not known to leak WC 3 collects LLLW from Building 3025 laboratories and hot cells and the 3098 filter pit The Metals and Ceramics Division (M&C) plans to consolidate the larger portion of their

activities in this building since the FFA will eliminate LLLW in several of their other facilities

Unconstrained Resources Case. A FY 1994 line item entitled Bethel Valley FFA Upgrades (WBS 3 31) will replace the LLLW system for this building Contingency plans will be implemented to ensure that M&C activities can continue in the event that the tank system fails ATDs Bottling stations will be installed on an FY 1992 GPP entitled 3000 Area LLW Upgrade (WBS 3 02) in the specimen preparation laboratory and for the hot cells A trucking station will be installed for the hot cells on a FY 1993 GPP entitled FFA Compliance Work II (WBS 3 85) to reduce personnel exposure from bottling activities

The 3098 filter pit will be enclosed on an out year GPP The LLLW lines from the filter pit will also be capped and the waste diverted to process waste by this GPP

Minimal Resources Case. The permanent LLLW system replacement project will be dropped assuming that all long term hot cell work in the facility will meet trucking or bottling waste acceptance criteria

Intermediate Compliance Case. Same as the unconstrained resources case

5 1 12 Buildings 2533/3504 (Tank WC-7 and 2533/2534 Sump Transfer Lines)

WC 7 is a singly contained tank that collects waste from Building 3504 the Geosciences Laboratory Contaminated soil samples and associated collection equipment are handled in this facility LLLW from Building 1505 is also disposed of at this facility Building 2534 off gas and Building 2533 cell vent systems collect condensate from the gaseous waste collection system (including condensate from the LLLW Evaporator facility ventilation systems This waste is presently transferred from Building 2533 sump to the LLLW system via an interconnection with the singly contained LLLW line connecting WC 7 to the central LLLW system The tank system is not known to leak

Unconstrained Resources Case. The generators in Building 3504 will be allowed to use the existing LLLW system until bottling stations can be installed on a FY 1992 GPP entitled 3000 Area LLW Upgrade (WBS 3 02) At that time WC 7 will be taken out of service The lines downstream of the tank will continue to collect the LLLW Evaporator

condensate until the FY 1994 Line Item entitled Bethel Valley FFA Upgrades (WBS 3 31) can line the sump and install a doubly contained LLLW line from Building 2533 to the central waste collection header The waste from Building 1505 will be diverted to the process waste system if possible A bottling station will be installed at Building 1505 if necessary

Minimal Resources Case. WC 7 will be taken out of service when the FFA becomes effective Generators in Building 3504 will bottle waste in a temporary system installed on expense funding until the FY 1992 GPP entitled 3000 Area LLW Upgrade (WBS 3 02) can install a permanent bottling station The LLLW lines that transfer the LLLW evaporator condensate will be upgraded as described under the unconstrained resources case The contingency plans for Building 1505 is the same as the unconstrained resources case

Intermediate Resources Case. Same as the unconstrained resources case

5 1 13 Hot Off-Gas Pot (Tank WC-9)

WC 9 is a singly contained tank located south of Building 3503 It collects waste from a small tank known as the HOG pot and leakage from the tank pump that leaks into the tank pit

Unconstrained Resources Case. The pump will be replaced on FY 1991 expense funds The condensate will continue to be collected in WC 9 until the FY 1994 Line Item entitled Bethel Valley FFA Upgrades (WBS 3 31) replaces the HOG pot LLLW tank and associated lines

Minimal Resources Case. Same as the unconstrained resources case

Intermediate Compliance Case. Same as the unconstrained resources case

5 1 14 Building 2026 (2026A)

The 2026A tank is a singly contained tank that is located in an underground vault east of Building 2026 It collects waste generated by research and chemical analyses activities performed in from Building 2026 It is not known to leak

Unconstrained Resources Case. The tank system will be replaced by a FY 1988 line item entitled Bethel Valley CAT System Upgrade (WBS 3 37) No contingency plans are being implemented

Minimal Resources Case. Same as the unconstrained resources case

Intermediate Compliance Case. Same as the unconstrained resources case

5 1 15 Tanks WC-4 WC-5, WC-6, WC-8, T-14, 4501-P, and 3002A

These tanks are not actively in service and have no near term planned usage They will be taken out of service when the FFA becomes active

Unconstrained Resources Case. No contingency plans or upgrades will be implemented for these tank systems

Minimal Resources Case. Same as the unconstrained resources case

Intermediate Compliance Case. Same as the unconstrained resources case

5 1 16 Nonprogrammatic Wastes

Projects will be implemented to eliminate nonprogrammatic wastes to filter pits and valve pits and/or the wastewaters will be diverted to process waste The projects identified to date are summarized below A FY 1994 GPP entitled Pipeline Additions for FFA will divert floor sumps in the 4500 area to process waste A FY 1993 GPP entitled Filter Pit Upgrade will enclose the cell plugs at the new Hydrofracture Facility A FY 1993 GPP entitled 3108 Filter Pit Enclosure will enclose the 3108 filter pit which serves Building 3019 The FY 1995 GPP entitled Miscellaneous FFA Upgrades in Bethel Valley will enclose the 3098 3109 and 3139 filter pits which serve Building 3025 and the ORR/BSR Work will begin in FY 1991 to identify the remaining sources of nonprogrammatic LLLW These sources will be handled via additional FY 1994 96 GPPs

5.2 CONTINGENCY AND UPGRADE/REPLACEMENT PLANS SUMMARIZED BY WASTE GENERATING DIVISION AT ORNL

The contingency and upgrade/replacement plans for the intermediate compliance case are described below by generating division This case has been selected for

submission to the regulatory authorities as the ORNL plan for meeting the FFA requirements (see sects 5 and 6)

5.2.1 Analytical Chemistry Division (ACD)

Building 7920 Rooms 108, 208 (Tanks WC-20, F-126) Sample analyses associated with REDC are performed here The average waste disposal is 2 5 gal/month These operations will continue to use the REDC LLLW system (See Sect 5 2 2 REDC for more information on this LLLW system)

Building 4500S Rooms S-155 C-159 (Tank WC-13) Sample analyses are performed in these labs The average waste disposal is 17 gal/month The LLLW tank will be taken out of service by the time the FFA becomes effective in FY 1991 At that time these two laboratories will bottle their LLLW Interim bottling will be installed on FY 1990 and FY 1991 expense funding The bottling stations will be upgraded as necessary for permanent use on an FY 1992 GPP entitled 4500 Area LLW Upgrade (WBS 3 96)

Building 2026 (Tank 2026A) Sample analyses and some research work are done in this building Average waste disposal is 90 gal/month The facility s tank is not known to leak and will be replaced by the Bethel Valley CAT System Upgrade line item (WBS 3 37) in approximately FY 1992 No contingency plans are needed

Building 5505 Analytical Chemistry Division plans on relocating laboratory operations from the Y 12 plant here in the future LLLW generations are expected to be less than 5 gal/month Interim bottling stations will be installed on expense funding and these will be upgraded as required for permanent use on the 1993 GPP entitled FFA Compliance Work II (WBS 3 85)

5.2.2 Chemical Technology Division (CTD)

Building 3026C, except Cells 1 & 2 (Tanks W-17 & W-18) The tanks receive inleakage and will be taken out of service in FY 1991 Building 3026C is in the IFSP The plan outlines shut down of the building during FY 1994 to include cleanup of hot cells and drainage and deactivation of piping to the hot cells glove boxes and hoods Currently several divisions with active projects occupy this building This includes the

H&SRD work (see that division heading for more information) the krypton operations in CTD that are expected to continue through September 30 1991 the Instrumentations and Control Division (I&CD) repair and maintenance of radiation monitoring equipment and Plant and Equipment Division s field engineering office The H&SRD group is the only group that currently generates LLLW in Building 3026C See the write up on H&SRD for their contingency and upgrade/replacement plans The IFSP assumes that all activities in Building 3026C will end in September 1991

Building 3028 [Tank WC-10 (3028E) Tank WC-2 (3028W)] All activities in the building related to isotope production work have ceased The facility is covered in the IFSP which indicates that cells will be cleaned and lines will be drained and deactivated during FY 1993 One cell (cell 7) has a drain to tank WC 2 WC 2 and WC 10 will be used to transfer waste generated by the IFSP without upgrade Direct access to the LLLW system will then be eliminated The LLLW line from 3028E to WC 10 leaks and must be repaired before it can be used

Building 3029 (Tank WC-10) This building does not house any active programs and it is in the IFSP The plan calls for the hot cells in the facility to be cleaned and the lines into the cells glove boxes etc to be drained and deactivated during FY 1993 WC 10 will be used to transfer waste generated by the IFSP without upgrade Direct access to the LLLW system will then be eliminated

Building 3030 (Tank WC-10) Building 3030 is an isotope processing building Currently there are no active programs in this facility The building is also in the IFSP and plans are to deactivate all piping in the facility Direct access to the LLLW system will be eliminated once the IFSP is complete

Building 3031 (Tank WC-10) This building is an isotope processing building and no active programs are currently occupying this facility This facility is also in the IFSP According to the IFSP the piping in the building will be deactivated Direct access to the LLLW system will be eliminated once the IFSP is complete

Building 3033 (Tank WC-10) There are no current activities in Building 3033 This facility is on the IFSP and the piping will be deactivated in FY 1993 There are no plans that require a working LLLW system to decontaminate the facility Direct access to the LLLW system will be eliminated once the IFSP is complete

Building 3033A (Tank WC-10) This building was an isotope processing building and no active programs are currently occupying this facility The IFSP strategy requires that the facility piping be deactivated during FY 1993 Direct access to the LLLW system will be eliminated once the IFSP is complete

Building 3038, areas 3038E and 3038M (Tank WC-10) Building 3038 was an isotope processing facility Isotope packaging shipping and receiving are currently ongoing The shipping work is to be relocated in the near future These facilities are on the IFSP list to have the piping deactivated during FY 1993 and FY 1994 The LLLW drains in these areas have been sealed to prevent inadvertent use because underground transfer lines are known to leak Fortunately no need for LLLW system access is foreseen and no contingency or upgrade/replacement plans are necessary

Building 3038, 3038-AHF also called 3038W (Tank WC-2) Building 3038 AHF is the Alpha Handling Facility in Building 3038 This area is not currently supporting any ongoing work, and is scheduled in the IFSP to have cells decontaminated and piping deactivated in FY 1994 WC 2 will be used for the IFSP Direct access to the LLLW will then be eliminated

Building 3047 except H&SRD facilities (Tanks WC-10 LA 104) Currently the facility is being used for carrier transloading and H&SRD activities are ongoing (see H&SRD write up) The IFSP calls for the hot cells in the facility to be decontaminated the lines to be drained and the piping to be deactivated during FY 1993 1994 This facility has many unique radioactive handling capabilities and portions of this facility will be used for future projects Contingency plans are being developed to use tank LA 104 to accumulate and truck LLLW generated in the facility A temporary trucking station will be installed on FY 1991 expense funding and it will be upgraded by an FY 1992 GPP entitled Building 3047 Trucking Station (WBS 3 03) This upgraded station will be used until an FY 1995 line item entitled FFA LLW System Upgrade (WBS 3 04) replaces the LLLW system for this building

Building 3019, A section (Tanks N-71 P 3, P-4) Some bench scale research and development work is ongoing in Building 3019A. These programs are currently generating approximately 30 gal/month of LLLW Waste in this facility is currently transferred to the LLLW evaporator complex through a singly contained line that runs from the building to valve box 1A, and then to the evaporator complex (tank W 22) A concrete SS lined

conduit containing several SS lines also leaves the building One line in the conduit (one 0 5 in SS pipe) which receives LLLW from the LLLW tanks (N 71 P 3 and P-4) was designed to transport waste to tank C 1 (an evaporator service tank which is currently used to store LLLW concentrate) An FY 1992 GPP entitled FFA Compliance Work I (WBS 3 28) will intercept this line install a valve box at the interception and run a doubly contained line from this point of interception to valve box 1A where the waste will be transferred to the evaporator service tank W 22 This piping replacement will enable Building 3019 to permanently transfer waste from the building to W 22 through a completely contained leak testable piping configuration thus complying with the FFA requirements

Building 3503 (Tank WC-9) No activities in this facility currently generate any LLLW and no future programs in this facility will require use of the LLLW system Direct access to the LLLW system will be eliminated

Building 3517 (Tanks S-223, 324 523) No active programs are currently operating in Building 3517 Cell decontamination is performed on a nonroutine basis Approximately 1 000 gal/month of LLLW are currently disposed of from this facility including inleakage to the filter pit and the tank vaults and waste from decontamination efforts Building 3517 is in the IFSP The plan calls for decontaminating the cells and draining and deactivating piping in FY 1994 It will be used long term to store isotopes sources and could possibly be used for Waste Management activities The system is doubly contained and is expected to be used as is until the Bethel Valley FFA Upgrades line item (WBS 3 31) installs a new LLLW system for this facility according to the design completed in the Bethel Valley CAT System Upgrade line item (WBS 3 37) It is assumed that documentation of the existing double containment will allow the system to continue to operate subsequent to the FFA signing However leak testing results may require systems shutdown

Building 4500N, corridors A&B (Tank WC-13) No CTD facilities in the 4500N building currently (or in the foreseeable future) produce LLLW Direct access to the LLLW system will be eliminated

Building 4501 Laboratories on first and second floors and in basement one glove box operation, hot cell operation (Tank WC-14) Research work is mainly done in these laboratories The currently predicted LLLW generation rate for the whole building is 11

gal/month Contingency plans for this area include bottling of LLLW and treatment of higher level radioactive liquids with inorganic ion exchange compounds prior to bottling to reduce the radioactivity The spent ion exchange material will be dried and disposed of as solid LLW Bottling and ion exchange (IX) treatment procedures for this area have been written and approved An FY 1995 line item entitled FFA LLLW System Upgrade (WBS 3 04) will replace the LLLW tank.

Building 4505 (Tank WC-11 & WC-12) No programs in Building 4505 currently (or in the foreseeable future) produce LLLW Direct access to the LLLW system will be eliminated

Building 4507 (Tank WC-12) This building is in the process of being turned over to the Surplus Facilities Program No active programs produce LLLW in this facility however rainwater/ground water inleakage to the inactive (ER program) T 30 tank sump is periodically pumped to the LLLW system This rate is estimated at about 130 gal/month Plans are to continue the transfer of this inleakage to the LLLW system until ER remediates the tank system

Building 7920 (Tank WC-20, F 111, F 126) REDC occupies Building 7920 The major mission of REDC is processing of reactor targets to produce transuranic isotopes for government and commercial uses The greatest volume of LLLW is the potassium hydroxide off gas scrubber liquid Smaller volumes result directly from processing steps Currently the generation rate at Building 7920 is about 1 000 gal/month Processing of a new target the Mark-42 Target is expected to begin in early 1991 The generation rate is predicted to increase to about 2 500 gal/month at that time The FY 1992 Melton Valley CAT System Upgrade line item will upgrade and/or replace all LLLW lines in the facility to meet FFA requirements and replace tank WC 20 with a doubly contained and monitored collection tank system Contingency plans are being implemented to avoid potential shutdown when initial ATDs are performed Development of the contingencies for disposal of LLLW centers on reducing the activity of the waste, so that the resultant liquid waste can be trucked to the central LLLW system in Bethel Valley for treatment The resulting secondary waste stream would be disposed of as a solid waste

Building 7930 (Tanks WC-20 B-2 T, B-3 T C-6-T) Building 7930 is the location of the ORNL Californium Facility and the associated equipment and facilities for handling Cf^{252} Approximately 70 gal/month of LLLW are generated at this facility Generator

tanks collect the liquid waste prior to its transfer to tank WC 20 The tank system is also doubly contained but the piping system is not See Building 7920 for a summary of the contingency and upgrade/replacement plans

5.2.3 Chemistry Division (CD)

Building 4500S, 2nd floor D-259, R 231 (Tank WC-13) Research activities in these laboratories produce small amounts of LLLW, about 2 gal/month The contingency plan for handling of LLLW generated in these laboratories is to bottle the LLLW A bottling station will initially be installed on FY 1990 91 expense funding It will be upgraded as necessary for permanent use on an FY 1992 GPP entitled 4500 Area LLW Upgrade (WBS 3 96) All LLLW drains will be sealed with epoxy cement and a SS plate to avoid any inadvertent use of the hot drains once the FFA shuts down the associated collection tank and lines

Building 4500N, C-29, D-29, F 31 (Tank WC-13) Research activities in these laboratories produce small amounts of LLLW (about 2 gal/month) The contingency plan for handling LLLW generated in these laboratories is to bottle the LLLW Bottling stations will initially be installed on FY 1990 91 expense funding They will be upgraded as necessary for permanent use on an FY 1992 GPP entitled 4500 Area LLW Upgrades (WBS 3 96) All LLLW drains will also be sealed as described above

5.2.4 Environmental Sciences Division (ESD)

Building 3504 (Tank WC-7) Two laboratories in the building have LLLW drains that are routinely used A total of approximately 80 gal/month are generated with the majority of the waste resulting from decontamination of small pieces of equipment Less than 5 gal/month are generated from research activities An FY 1992 GPP entitled 3000 Area LLW Upgrade (WBS 3 02) will install bottling stations in both of these laboratories The tank WC 7 will be used to collect waste until the bottling stations can be installed The system will be removed from service at that time

Building 1505 LLLW from Building 1505 is bottled and transported to Building 3504 for disposal This waste will be diverted to the process waste system if it meets the

waste acceptance criteria If it does not a bottling station will be installed for the facility A temporary bottling station will be installed on expense funding and it will be upgraded as necessary on the 1993 GPP entitled FFA Compliance Work II (WBS 3 85)

5.2.5 Health and Safety Research Division (H&SRD)

Building 3026C, 2 hot cells and 3 rooms (Tank W-17 & W 18) Iridium and osmium radioisotopes processing and research activities generate small volumes of LLLW These tanks will be removed from service by the FFA in FY 1991 The planned contingency is to bottle any LLLW generated H&SRD plans to purchase two hot cells on capital equipment funds for installation in Room 110 of Building 3047 thus eliminating the need for continued use of the Building 3026C facilities Should H&SRD continue to perform work in Building 3026C a bottling station should be installed in the hood behind cell bank No 1

Building 3047 Rooms 207 210 (Tank WC-10) These laboratories are used by H&SRD to process research and test radioactive materials for use in nuclear medicine Average volumes of LLLW are < 10 gal/month The planned contingency is to bottle any LLLW generated in these laboratories Bottling stations will be installed for hot cells described above and in Rooms 207 and 209 using FY 1990 91 expense funding They will be upgraded as necessary for permanent use by an FY 1992 GPP entitled 3000 Area LLW Upgrades (WBS 3 02)

5.2.6 Metals and Ceramics Division (M&C)

Building 3025E, East side of Building 3025 (Tank WC-3) This facility has six hot cells and a sink in the cell access area The sink and five of the six cells have an LLLW drain Average volume of LLLW generated is on the order of 5 gal/month The majority of LLLW is a result of routine mopping of the cell access area In addition to ongoing activities a new Specimen Preparation Laboratory (SPL) is being equipped with 3 new glove boxes each of which will require a way to dispose of LLLW An FY 1994 line item entitled Bethel Valley FFA Upgrades (WBS 3 31) will replace the LLLW system for this building Contingency plans will be implemented to ensure that M&C activities can

continue in the event that the tank system fails ATDs Bottling stations will be installed on an FY 1992 GPP entitled 3000 Area LLW Upgrade (WBS 3 02) and a trucking station will be installed for the hot cell area on an FY 1993 GPP entitled FFA Compliance Work II (WBS 3 85)

Building 3026D (Tank W-16) Currently, no activities are ongoing in this facility, however there are plans to remediate the facility in the near future to the extent necessary to release it to the surplus facilities program This is projected to take between 0 5 and 1 year to complete Plans are to keep tank W 16 active through 1991 to complete this work since the tank is not known to leak. No replacement LLLW systems or contingency systems are planned for this facility

Building 3525 (Tanks W 12, F-201 F 501) Tank W 12 will be taken out of service when the FFA becomes effective It is assumed that F 501 and F 201 can continue to be used until they are replaced The current plan is to perform piping modifications on F 501 using FY 1990 and FY 1991 expense funding This will allow waste to be transferred from F 501 to an existing LLLW tanker for transport to the LLLW evaporator system A doubly contained pipeline that will bypass tank W 12 and connect to the LLLW system at Valve Box 2A will be constructed as a part of the FY 1992 GPP entitled FFA Compliance Work I This will afford Building 3525 a means of LLLW disposal until the FY 1994 line item entitled Bethel Valley FFA Upgrades (WBS 3 31) replaces the LLLW system per the original scope of the Bethel Valley CAT System Upgrade Line Item design

Building 4501 third floor (Tank WC-13) Tank WC 13 will be removed from service once the FFA becomes effective M&C activities generate approximately 1 gal/month of LLLW from electropolishing disk specimens that have been irradiated The contingency plan for handling any LLLW generated in this area is to bottle the LLLW A permanent bottling station has not been planned for this facility since M&C plans to move the work elsewhere in the near future LLLW drains will be capped when the FFA becomes effective

Building 4508, Room 242 (Tank WC-13) Research activities in room 242 generate small volumes of LLLW Two hoods each accommodating an operation that generates a different waste solution, are contained in this laboratory The contingency plan for this area is to bottle any LLLW generated Two bottling stations will be installed on FY 1990

and 1991 expense funding An FY 1992 GPP entitled 4500 Area LLW Upgrade (WBS 3 96) will upgrade the bottling stations in this laboratory as necessary for permanent use

5.2.7 Office of Waste Management and Remedial Actions

Building 3001, demineralizers (Tank WC-19) Building 3001 houses the decommissioned OGR Demineralizer ion exchange columns used to maintain acceptable levels of contamination in the canal pool water are regenerated approximately twice a year The estimated generation of LLLW when regenerating the columns is about 340 gal/month The tank is needed to support the closure plan for the OGR pool leak and is needed to receive ion exchange regenerant from the demineralizers The OGR demineralizers will be shut down when interim closure is completed in FY 1991

Building 3098, (Tank WC-3) This is the filter facility for the inactive Low Intensity Test Reactor (LITR) and the BSR The LITR is the responsibility of the ER Program while the BSR is a Research Reactor Division facility Some inleakage is collected in Building 3098 and is pumped to tank WC 3 The estimated volume collection for WC 3 in 1989 was 8 gal/month, however this volume has decreased during 1990 Any liquid that is collected in the filter facility will continue to be sent to tank WC 3 until the filter pit is enclosed on an FY 1995 GPP entitled Miscellaneous FFA Upgrades in Bethel Valley (WBS 3 07) The LLLW lines from the filter pit will also be capped and the waste diverted to process waste by this GPP

Evaporator Complex/Concentrate Storage (Tanks C-1, C-2, and W-21 through W-31) These tanks are needed to operate the Central LLLW Evaporator System All tanks are secondarily contained however the vault containing C 1 and C 2 is not lined It is assumed that these tanks can be used without upgrades Contingency plans for these tanks are to upgrade with expense funding as necessary to eliminate leaks C 1 and C 2 will be taken out of service as soon as the Waste Handling and Packaging Plant (FY 1994 line item project) processes enough of the LLLW inventory in the MVST to allow the tanks to be emptied

Building 3544 (Tank L-11) The PWTP (Building 3544) is needed to treat slightly contaminated process wastewater including the LLLW evaporator overheads L-11 is a singly contained above ground tank that is visually inspectable The piping to the central

LLLW system is singly contained but can be pressure tested An FY 1992 Energy Systems Central Waste Management line item (WBS 1 1 4 2) will install a Class L-I Landfill Leachate Waste Decontamination Facility at the ORNL PWTP that will implement upgrades to eliminate LLLW generation at the facility Contingency plans include installation of a stainless pan under L-11 on an FY 1992 GPP entitled 3544 IE/E Room Upgrade (WBS 3 78)

Building 2533 and 2534 (Tank WC-7 transfer lines) WC 7 is a singly contained tank that collects waste from Building 3504 Building 2534 off gas and Building 2533 cell vent systems collect condensate from the gaseous waste collection system (including condensate from the LLLW Evaporator ventilation system) in the Building 2533 sump This waste is presently transferred to the LLLW system via an interconnection with the singly contained LLLW line connecting WC 7 to the central LLLW system The tank system is not known to leak. The lines downstream of the tank will continue to collect the LLLW Evaporator ventilation condensate until the FY 1994 Line Item entitled Bethel Valley FFA Upgrade I (WBS 3 31) can line the 2533 sump and install a doubly contained LLLW line from Building 2533 to the Central Waste collection header

Hot Offgas Pot (Tank WC-9) WC 9 is a singly contained tank located south of Building 3503 It collects waste from a small tank known as the HOG pot and leakage from the tank pump pit The pump will be replaced on FY 1991 expense funds The condensate will continue to be collected in WC 9 until the FY 1994 line item entitled Bethel Valley FFA Upgrades (WBS 3 31) replaces the pot LLLW tank and associated lines

Building 3092 (WC-2 LLLW Line) This is the off gas scrubber for the 3039 stack The waste is transferred via piping that interconnects with the LLLW line leaving tank WC 2 This waste will continue to be routed in this way until the Bethel Valley CAT System Upgrade Line Item installs a new doubly contained pipe from Building 3092 to the LLLW evaporator system

Pump pit (Tank WC-8) Tank WC 8 previously collected LLLW from the pump pit This waste has been diverted to tank WC 9 and tank WC 8 has been removed from service

5.2.8 Office of Environment, Safety, and Health Compliance

Building 4500S H-247 (Tank WC-13) This laboratory generates approximately 15 gal/month of LLLW from ground water sampling and monitoring The waste is collected in sample bottles in the field for analyses The contingency plan is to divert the waste to process The LLLW drains will be blocked from further use after the FFA becomes effective

5.2.9 Research Reactors Division (RRD)

Building 3042 (Tank WC-19) Building 3042 houses the ORR that is permanently shut down LLLW is generated as a result of regeneration of ion exchange columns that serve the facility The current plan is to use this system as is (WC 19 is an ES&H tank) until an FY 1992 GPP entitled ORR/BSR LLW Upgrade (WBS 3 79) installs alternative treatment options for these waste streams The GPP will divert the pool overflows and floor drains to the process waste system Diversion of the pool overflows will allow the ion exchange columns to be taken out of service

Building 3010 (Tank WC-19) Building 3010 the BSR is currently in extended shutdown mode with the system being maintained A part of this maintenance involves periodically regenerating ion exchange columns that serve the facility The contingency plan is to use this system as is by utilizing WC 19 as an ES&H tank until an FY 1992 GPP entitled ORR/BSR LLW Upgrade (WBS 3 79) installs alternative treatment options for these waste streams The GPP will divert the pool overflows and floor drains to the process waste system Diversion of the pool overflows will allow the ion exchange columns to be taken out of service as long as the reactor is not operating The ion exchange columns for the BSR will be replaced with units that will allow direct disposal of the loaded resins as a solid waste (as opposed to regeneration of the columns to produce LLLW in the present process) for treatment of the pool water when the reactor is in operation

Building 7900 (Tanks HFIR, T 1 and T 2) This tank system consists of three singly contained tanks and associated piping The tanks receive waste from the HFIR its associated research and development laboratories the off gas stack from Building 7911

and filter pit wastes from Buildings 7913 and 7920 The FY 1992 line item entitled Melton Valley CAT System Upgrade (WBS 3 45) is scheduled to replace the entire LLLW system in the HFIR area The system is being considered for an ES&H exemption in the event that leaks develop during the interim period Unfortunately the reactor would have to be shut down to warrant the ES&H status usage Therefore contingency plans will implement alternative treatment/disposal methods to avoid possible shutdown of HFIR when ATDs are performed The contingency plan for Building 7900 calls for installing an ion exchange system to treat laboratory waste and waste from the reactor sample sink to produce process waste The loaded ion exchange resins from this ion exchange system and the six reactor ion exchange columns will be disposed of as solid waste (rather than regenerating the columns to produce LLLW as in the present process) Upgrades include installing lines to sluice resins out of the ion exchange columns into shielded containers installing a dewatering station, and installing a transfer station to prepare the resins for shipment and disposal as solid waste The stack drainage from Building 7911 and filter pit waste would be diverted to process waste (after decontamination and upgrades of the filter system) The system to dispose of resin as a solid waste will be installed on FY 1990 1992 expense funding The HFIR waste treatment system and resin dewatering/disposal systems will be installed by an FY 1992 project entitled HFIR LLLW System Upgrade (WBS 3 01) and an FY 1993 project entitled LLW Treatment Alternatives (WBS 3 35) The stack drainage and filter pit waste will be diverted to process waste using an FY 1994+ GPP

Building 3098 (Tank WC-3) See ER programs item 2

6. IMPLEMENTATION OF CONTINGENCY, UPGRADE, AND REPLACEMENT PLANS

The strategy for the FFA contingency and upgrade/replacement plans are described in Sects 2 and 5 The funding requirements methods being used to implement these plans a proposed schedule for implementation and the present status of the program are described in this section

6 1 FUNDING REQUIREMENTS

Three cases were considered for implementing contingencies and upgrades/replacements for the LLLW system required to meet the FFA. The cases are the unconstrained resources the minimal resources and the intermediate compliance cases The unconstrained resources case was expected to be the most feasible case for meeting anticipated regulatory expectations but results in inefficient use of limited resources and difficulties in implementation of ATDs The case assumes that the LLLW system would have to be leak tested by available conventional vacuum or pressure test methods in the FY 1991 to FY 1995 time frame and that either valves could not be added to most of the LLLW tank systems to perform these tests or the systems would not pass ATDs Therefore contingency measures would have to be put in place for essentially all tank systems before upgrade/replacement projects could be implemented The minimal resources case requires major concessions from regulators with regard to diminished expectations on leak testing implementation This case allows funding resources to be focused on upgrading and replacing portions of the system and minimizes leak testing and implementing contingency measures required by the FFA for interim operation of systems Further this scenario has the disadvantage of leaving ORNL in a more vulnerable position since no contingencies would be in place if the regulators did not agree to the suggested concessions The intermediate compliance case is a compromise between the other two cases It assumes that state-of the art leak testing methods can be developed to test tank systems at a reduced cost and with less exposure to personnel To reduce funding requirements contingency measures will be implemented for a limited number of tank systems Since many tank systems are still likely to fail these leak tests this case increases the likelihood that tank systems will be temporarily shut down (5 10 years) until upgrade/replacement projects can be completed All three cases for each situation are described in detail in Sect 5

Preliminary funding requirements for the three cases were developed by the FFA response team and are summarized in Tables 6-8 These tables indicate that $175 1M $129 1M and $172 9M would be required to implement the unconstrained resources the minimal resources and the intermediate compliance cases respectively Of these funds $115 9M $95 0M and $120 7M would be needed for contingency and

upgrades/replacement projects between FY 1991 and FY 2001 respectively The reduced costs for the minimal resources case are associated with elimination of leak testing and contingency plans for essentially all LLLW systems except potentially leaking systems that will be taken out of service when the FFA becomes effective The intermediate compliance case replaces conventional pressure or vacuum tests through development of less expensive (preliminary) state-of the art leak testing methods Since this assumes leak testing will be performed on all systems contingency plans were added to support the most vulnerable tank systems Although WC 10 which serves Isotopes Circle is a potential leaking tank system contingency plans for IFSP were not supported because of funding limitations in the required time frame The plans for upgrades and replacements secondary containment demonstrations and removal from service plan for the intermediate compliance case are very similar to those of the unconstrained compliance case The cost estimates for the intermediate compliance case were developed at a later date than those for the unconstrained resources and minimal resources cases The cost estimates are more refined for the intermediate compliance case and are higher than cost estimates for similar activities in the unconstrained resources and minimum resources cases

The ORNL FFA response team presented the unconstrained resources and minimal resources cases to DOE/Oak Ridge Operations (DOE/ORO) on September 7 October 16 and November 9 1990 and recommended that the minimal resources case be pursued because it most efficiently achieves the final goal of system upgrade/replacement The FY 1991 cost requirements for the two cases were estimated to be $15 9M and $11 5M, while the FY 1992 requirements were $14 9M and $10 3M respectively However, neither of these cases could be implemented without modification because of significant funding shortfalls that is the FFA Activity Data Sheet (ADS) funding (based on the President s budget) for these years was $1 8M and $3 9M respectively ORNL was asked by DOE/ORO to review all appropriate ADSs to identify additional near term funding that could be redirected to the FFA compliance effort and to develop a compliance case based on state-of the art leak testing methods to be determined by leading experts in the area for submission to EPA and TDHE in the deliverable reports required by the FFA. About $5 7M has been identified for FFA compliance in FY 1991

Table 6. Cost assessments for FFA implementation for the active ORNL liquid low level waste systems by task[a]

Compliance activity	Unconstrained resources case $M	Minimal resources case $M	Intermediate compliance case $M
Program management	27.3	27.3	27.3
Contingency plans & implementation	23 2	6.5	12.1
Upgrade/replacement plans	92.7	88 5	108 6
Secondary containment demonstrations	0 9	0 9	1.3
Assessments	27 2	2.1	13.5
Removal from service	3 8	3 8	10 1
TOTALS	**175 1**	**129 1**	**172.9**

Bethel Valley CAT System Upgrade (FY 1988) Landfill Leachate Decontamination Facility (FY 1992) Waste Handling and Packaging Plant (FY 1994) and Melton Valley CAT System Upgrade (FY 1992) Line Item funding is not included Cost assessments are in FY 1990 dollars

Table 7 Cost assessments for FFA implementation for the active ORNL liquid low-level waste system by fiscal year[a]

Year	Unconstrained Resources case ($M)	Minimal resources case ($M)	Intermediate compliance case ($M)
1991	15 9	11 5	5 7
1992	14 9	10 3	16 3
1993	22.9	13 4	17 2
1994	20 5	11 1	29 7
1995	23 9	14 6	41 4
1996	22 3	18 4	41 4
1997	15 8	13 5	11 3
1998	14 5	13 2	3 2
1999	14 0	12 7	3 3
2000	8 7	8 7	1 9
2001	1 7	1 7	1 5
TOTALS	175 1	129 1	172.9

Bethel Valley CAT System Upgrade (FY 1988) Landfill Leachate Decontamination Facility (FY 1992) Waste Handling and Packaging Plant (FY 1994) and Melton Valley CAT System Upgrade (FY 1992) Line Item funding is not included Cost assessments are in FY 1990 dollars

Table 8. Cost assessments for FFA contingency and upgrade/replacement projects for the active ORNL liquid low level waste system

Facility	Unconstrained resources case ($M)	Minimal compliance case ($M)	Intermediate compliance case ($M)
4500 Area	7 80	7 80	3 6
3019	0 90	0 90	0 9
3517	14 60	11 1	16 8
3525	12 40	12 4	17 6
Isotopes Circle	44 30	40 4	35 0
3544	3 70	1 4	1 4
HFIR	6 60	0 8	3 3
REDC	7 60	2 3	4 3
ORR/BSR	2 10	2 0	1 6
3025	1 40	1 4	7 0
2533/3504	1 20	1 20	7 9
HOG Pot	2 10	2 10	7 6
Evaporator Complex	0	0	0
2026	0	0	0
Nonprogrammatic	11 20	11 2	13 7
TOTALS	**115 90**	**95 00**	**120 70**

Bethel Valley CAT System Upgrade (FY 1988) Landfill Leachate Decontamination Facility (FY 1992) Waste Handling and Packaging Plant (FY 1994) and Melton Valley CAT System Upgrade (FY 1992) Line Item funding is not included Cost assessments are in FY 1990 dollars

and about $16 3M for FY 1992 DOE/ORO gave the ORNL FFA response team guidance to develop a compliance schedule that would be consistent with this level of funding This scenario has been described as the intermediate compliance case throughout this report It will be submitted to the regulators as part of the FFA deliverables document The remainder of this report discusses the FFA contingency and upgrade/replacement plans and schedules for the intermediate compliance case

6.2 IMPLEMENTATION APPROACH

The FFA contingency and upgrade/replacement plans are being implemented by numerous capital projects and expense funded projects These projects include both administrative and physical modifications to the LLLW system that are required to implement contingency and upgrade/ replacement measures Contingency plans include tank system modifications for interim use alternative treatment or collection systems revision of operating documents employee education and capping of lines Upgrade/replacement projects modify the system as necessary to meet full secondary containment and leak detection requirements

6.2.1 Project Descriptions

Initial FY 1990 1991 expense projects are being used to implement contingency measures for facilities that lose access to the LLLW system via tank systems when the FFA becomes effective Out year contingency planning efforts are focusing on the most vulnerable systems and the systems that will require the most lead time to implementcontingency measures should the tank system fail ATDs The expense projects are summarized in Table 9

Capital projects are being used to implement contingency measures and/or permanent upgrades/replacements for all the presently active LLLW systems that have long term waste generation plans The line item projects and GPPs are summarized in Table 10

The projects described in Tables 9 and 10 are organized by funding type and the fiscal year when funding is expected to be obtained These tables include information on

Table 9 Expense-funded projects identified for FFA implementation

Funding year	Title	Scope	Tank groupings partially upgraded	Tank groupings completely upgraded or removed from service	TEC[b] ($M)
1990 91	Temporary bottling stations	Installs bottling stations for tanks removed from service in 1991 1992 GPPs will upgrade stations as necessary for permanent use	—	WC 11 WC 12, WC 13 WC 14	0 6
1990 91	3525 Trucking Station	Installs a temporary trucking station for Tank F501 to allow removal of tank W 12 from service in 1991 Station will be removed from service by 1992 GPP # 3 28.	—	W 12	0 2
1991	3047 Trucking Station	Installs a temporary trucking station for Building 3047 Station will be upgraded as necessary for long term use by 1992 GPP # 3 03	WC 10	—	0 1
1991 92	Relocation activities	Relocates activities in buildings utilizing tanks W 17 and W 18, that will be removed from service in 1991	—	W 17 W 18	0 2
1990 92	HFIR source treatment	Installs source treatment to reduce volume and radioactivity of LLLW	HFIR	—	0 8
1990 94	REDC source treatment	Installs source treatment to reduce volume and radioactivity of LLLW	REDC	—	3 4
1990	ORR/BSR contingencies	ORR/BSR Ion Exchange Columns regenerated in case ES&H exemption is not accepted by regulators.	—	—	0 04
1990	4501 source treatment	Installs so rce treatm nt to red ce rad oa tivity of LLW to meet bottling req rem nts.			0 02

[a]See Table 2 for LLLW tanks associated with a given facility
[b]TEC = total estimated cost. $0 56M was provided in FY 1990 and has not been included in FFA cost estimates

Table 10 Capital projects identified for FFA implementation

Year	ID # (WBS)	Title	Scope	Tank groupings partially upgraded	Tank groupings completely upgraded or removed from service	TEC[b] ($M)
GENERAL PLANT PROJECTS						
1992	3 79	ORR/BSR LLW Upgrade	Provides source treatment to convert LLLW to solid and process waste	—	ORR/BSR	0 5
1992	3 78	3544 IE/E Room Upgrade	Doubly contains Tank L-11	3544	—	1 1
1992	3 01	HFIR LLW System Upgrade	Provides source treatment to convert LLLW from laboratory facilities to solid and process waste	HFIR	—	1 1
1992	3 02	3000 Area LLW Upgrade	Provides bottling stations for low volume generators.	—	3504	1 0
1992	3 96	4500 Area LLW Upgrade	Provides bottling stations for low volume generators.	4500 Complex	—	1 1
1992	3 03	Building 3047 Trucking Station	Provides trucking station for 3047 generators.	Isotopes Circle	—	0 85
1992	3 28	FFA Compliance Work I	Doubly contains noninspectable piping for 3019 Installs doubly contained piping to bypass leaking LLLW tank at 3525	3525	3019	1 1
1993	3 85	FFA Compliance Work II	Provides bottling/trucking stations for 3025 1505 and 5505	3025	—	0 85
1993	3 35	LLLW Treatment Alternative	Provides source treatment to convert LLLW from HFIR reactors to solid and process waste	HFIR	—	1 0
1993	3 16	Piping Additions for FFA	Pipes 4500 area floor sumps to process waste	4500 Complex	—	1 1
1993	2.29	Filter Pit Upgrade	Enclose filter pit at REDC	REDC	—	0 6
1993	2.30	3108 Filter Pit En los re	Enclose filter pit 3108 which services B ld ng 3019	3019	—	0 5
1994	—	3 GPPs to be defined	Eliminate nonprogrammatic waste generation or upgrade appropriate collection/transport system for secondary containment.	—	—	3 3
1995	—	3 GPPs to be defined	Eliminate nonprogrammatic waste generation or upgrade appropriate collection/transport system for secondary containment.	—	—	3 3
1996	—	3 GPPs to be defined	Eliminate nonprogrammatic waste generation or upgrade appropriate collection/transport system for secondary containment.	—	—	3 3

[a]See Table 2 for LLLW tanks associated with a given tank grouping.
[b]TEC = total estimated cost.

Table 10 (continued)

Year	ID # (WBS)	Title	Scope	Tank groupings partially upgraded	Tank groupings completely upgraded or removed from service	TEC[b] ($M)
LINE ITEM PROJECTS						
1988	3 37	Bethel Valley CAT System Upgrade	Replaces 2026 tank system and the hot off gas scrubber LLLW piping. Provides upgraded tanker truck and bottle unloading stations.	–	2026	35
1992	3 45	Melton Valley CAT System Upgrade	Replaces or upgrades tank systems for REDC and HFIR.		REDC HFIR	41
1993	1 1 4 1	Landfill Leachate Waste Decontamination Facility[c]	Provides source treatment to convert LLLW to solid waste	–	3544	18[d]
1994	3 31	Bethel Valley FFA Upgrades	Replaces tank systems for 3517 3525 3025 HOG and WC 9 Doubly contains LLLW piping for 2533	–	3517 3525 HOG Pot 2533 Transfer Lines	45
1994	4 13	Waste Handling and Packaging Plant[c]	Provides treatment capabilities for concentrated LLLW wastes. C 1 and C 2 will be emptied and removed from service when treatment system becomes operational.	–	C 1 & C 2 of E aporator Complex	250
1995	3 04	FFA LLW System Upgrade	Replaces tank systems for WC 10 of the Isotopes Circle and WC 14 for 4501	–	3025 Isotopes Circle	35
EXPENSE FUNDING FOR CAPITAL PROJECTS						
1991 1988						15 2

[a]See Table 2 for LLLW tanks associated with a given tank grouping.
[b]TEC = total estimated cost.
[c]Not included in FFA cost estimates.
[d]For ORNL portion of the task.

project scope tank systems/groups that will be temporarily upgraded for interim operation or permanently upgraded/replaced and total estimated cost Projects proposed for FY 1992 and beyond have not yet received budget approval or authority thus the total estimated costs provided have not been verified All of these projects are presently in the planning phases and their scopes cost estimates and schedules are subject to change as details are developed the detailed cost estimates are completed and yearly budgets are obtained

Expense funded projects FY 1992 1993 GPPs and FY 1988 1995 line item projects have been defined to upgrade or replace the LLLW tank systems that collect programmatically generated waste If leaks in the tank systems are identified in the interim period programmatic inputs except for ES&H waste streams will be stopped and the system will be repaired as soon as possible The system will continue to collect nonprogrammatic wastes during this period These include wastes collected in building and vault sumps condensate from the gaseous ventilation system and inleakage to tank vaults valve pits and filter pits Studies are presently in place to identify waste collected from nonprogrammatic sources These studies will evaluate the feasibility of eliminating these wastes diverting them to the process waste system or upgrading the collection/transfer system to meet secondary containment standards GPPs have been planned for FY 1993 1996 to address these waste sources

6.2.2 Implementation Mechanisms

Existing organizations in the ORNL Waste Management Program are set up to implement activities such as contingency plans and upgrade/replacement projects for thewaste collection transport and treatment systems The Waste Management Coordination Office (WMCO) manages strategic planning activities for the ORNL Waste Management systems supervises technical development activities that support waste management systems and facility definition identifies and prioritizes capital projects arising from strategic planning and implements certification programs and administrative controls for waste generators The Environmental Projects Group manages environment related GPPs and line item projects from development of the functional requirements document through the final transfer of a system to the operating client The Waste Management

Operations Group (WMO) is responsible for operating the centralized LLLW waste collection/transfer/treatment system These organizations are being utilized to implement the FFA contingency and upgrade/replacement projects as defined below All of these efforts will be coordinated by the Active LLLW System Assurance Program Manager within ORNL Waste Management Programs

The WMCO is responsible for developing the strategic plans for the FFA contingency plans and upgrade/replacement projects This group will ensure consistency between the FFA implementation plans and short and long term waste management strategies that are constantly evolving for liquid and solid waste This group will also ensure that the FFA implementation plans are consistent with the Waste Certification and Waste Reduction Programs The group will define and prioritize lists of capital projects arising from these strategic planning efforts and will manage all technical development activities needed to support FFA contingency plans They will also be responsible for coordinating all expense funded contingency plan projects implemented by the generators

WMCO will also be responsible for developing and administering training for bottling of LLLW to waste generators Their responsibilities will also include notifying waste generators when LLLW drains must be removed from service and certifying that administrative controls have been implemented to eliminate access to the drains These activities will be coordinated by the Laboratory Certification Official for Liquid Waste and administered through the area Liquid Waste Generator Certification Officials appointed by ORNL Division Directors

WMO will operate the system make repairs to the centralized system manage all expense funded projects associated with contingency plan implementation for the central system and develop bottling and trucking procedures that will cover collection from generator, transportation and discharge to central system WMCO will provide assistance and support to the WMO including coordination of generator bottling and tracking procedures to ensure that such activities are consistent with WMO waste acceptance criteria and procedures

Environmental Projects will be responsible for implementing capital projects that have been identified by the WMCO They will be responsible for the development of functional requirements documents preliminary proposals preparation of supporting

documentation [Quality Assurance (QA) Safety National Environmental Policy Act (NEPA) compliance and risk assessments] and coordination of Engineering activities

6.3 PROPOSED SCHEDULE

The schedule for the FFA contingency and upgrade/replacement projects which are described in Tables 9 and 10 are summarized in Figs 4 and 5 Fig 4 organizes the upgrade projects by affected facilities (The associated tank groups are listed in Table 2) Fig 5 organizes these items by project

6 4 PRESENT STATUS

FY 1990 activities focused on necessary planning Options for contingency measures and upgrade/replacement projects were identified and the implementation plan described in this report was developed Contingency measures (funded on operating expense) were initiated in FY 1990 for the tank systems that will definitely be shut down when the FFA becomes effective These efforts are being continued in FY 1991 Implementation of contingency plans for tanks likely to lose LLLW access in the near future began in FY 1991 and will continue in FY 1992 Planning activities for FY 1992 GPPs and FY 1994 line item projects has also begun Repair projects for potentially leaking system components have been identified for tanks WC 9 and WC 10

All activities that have been identified for FY 1991 have begun Bottling procedures should be in place for low volume generators by the time the FFA becomes effective The bottling equipment is available and generator training and waste transportation procedures have been written They are awaiting approval from safety ALARA, and transportation groups Installation of trucking stations for Buildings 3525 and 3047 have begun but have been delayed by NEPA documentation The FFA is likely to shut down these facilities for several months Tanks WC 9 and WC 10 (which support the HOG System and Isotopes Circle) are likely to be shut down because repairs for potentially leaking system components will not be completed before the FFA becomes effective Capital project activities are underway

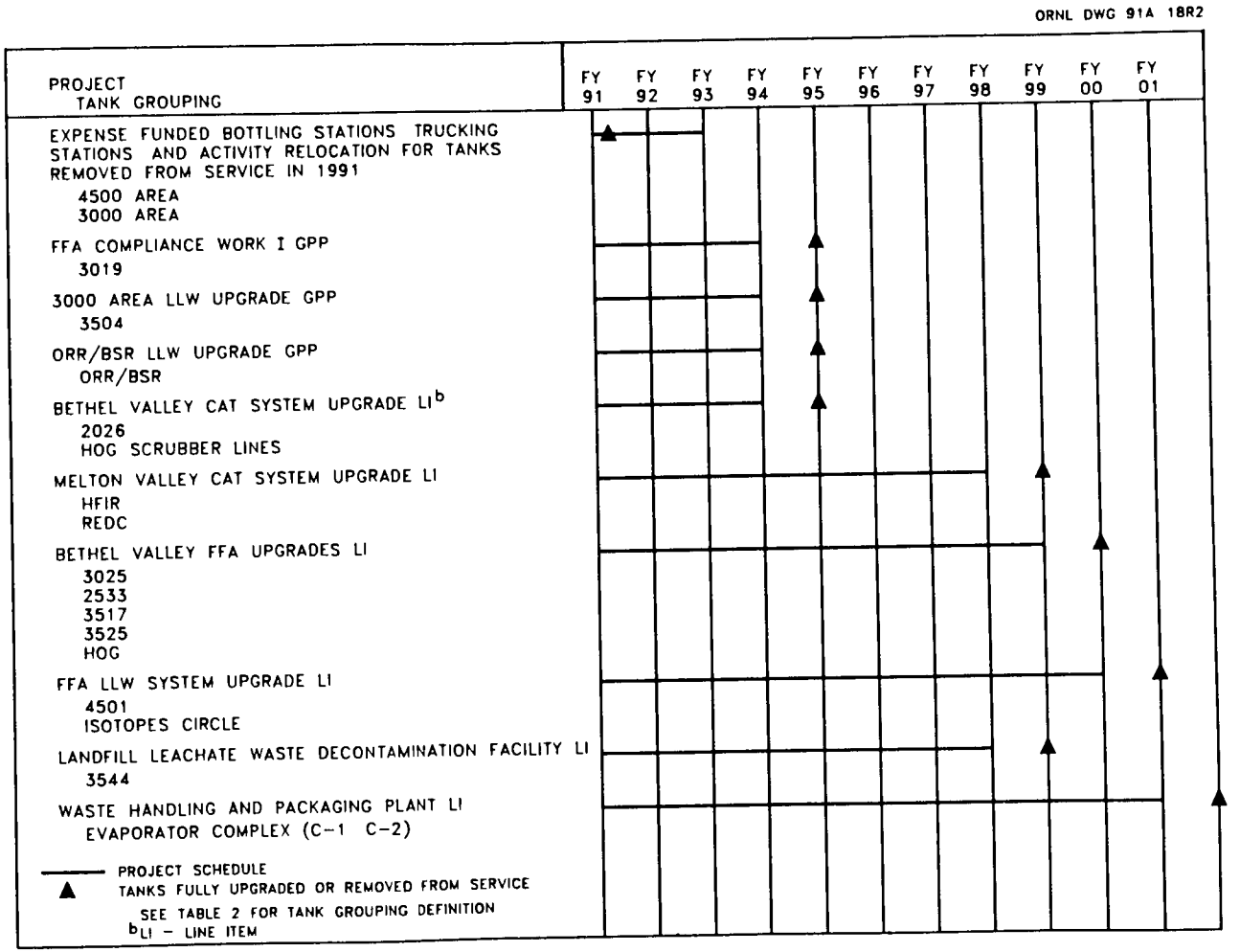

Fig 4 FFA implementation schedule by project.

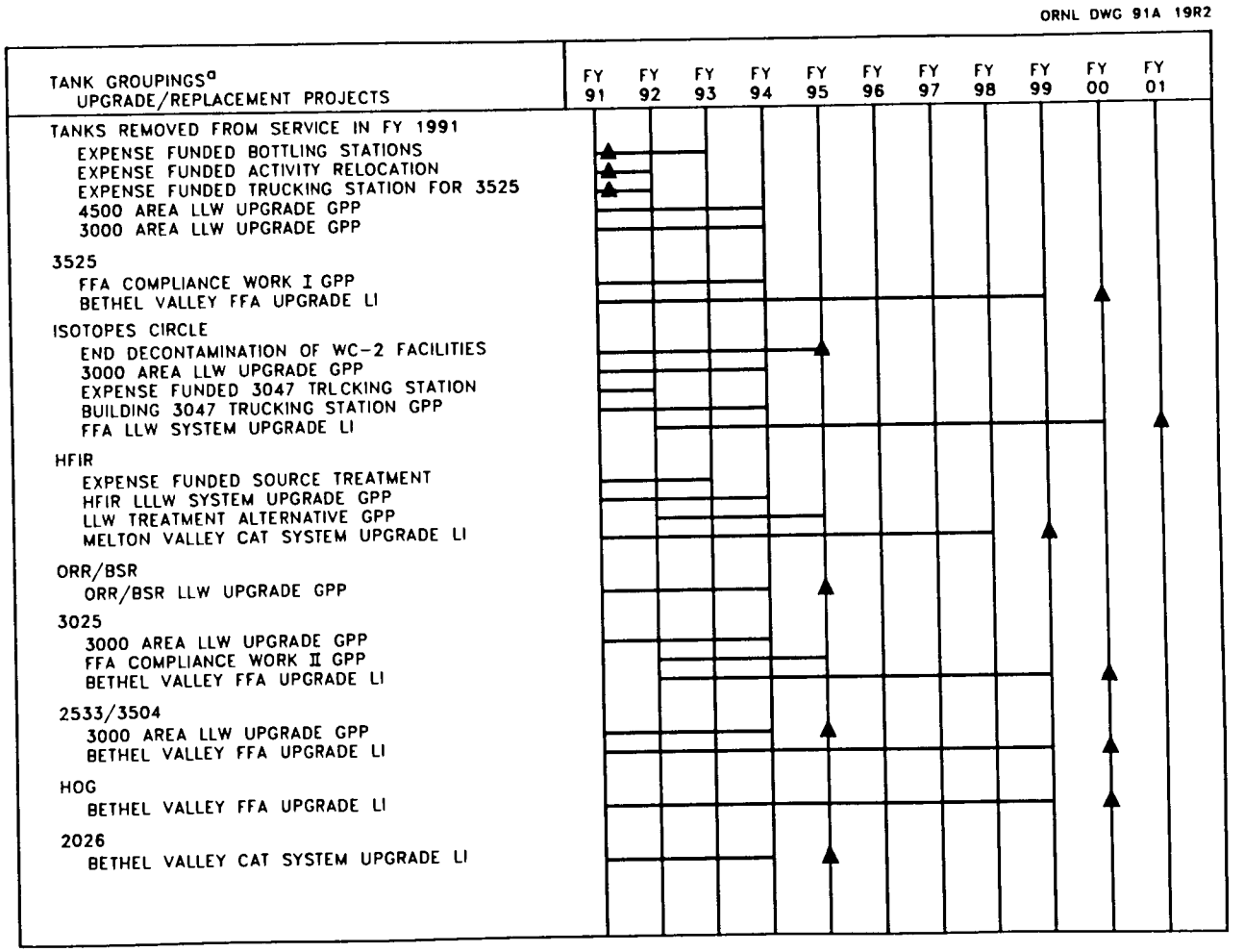

Fig 5 FFA implementation schedule by affected areas

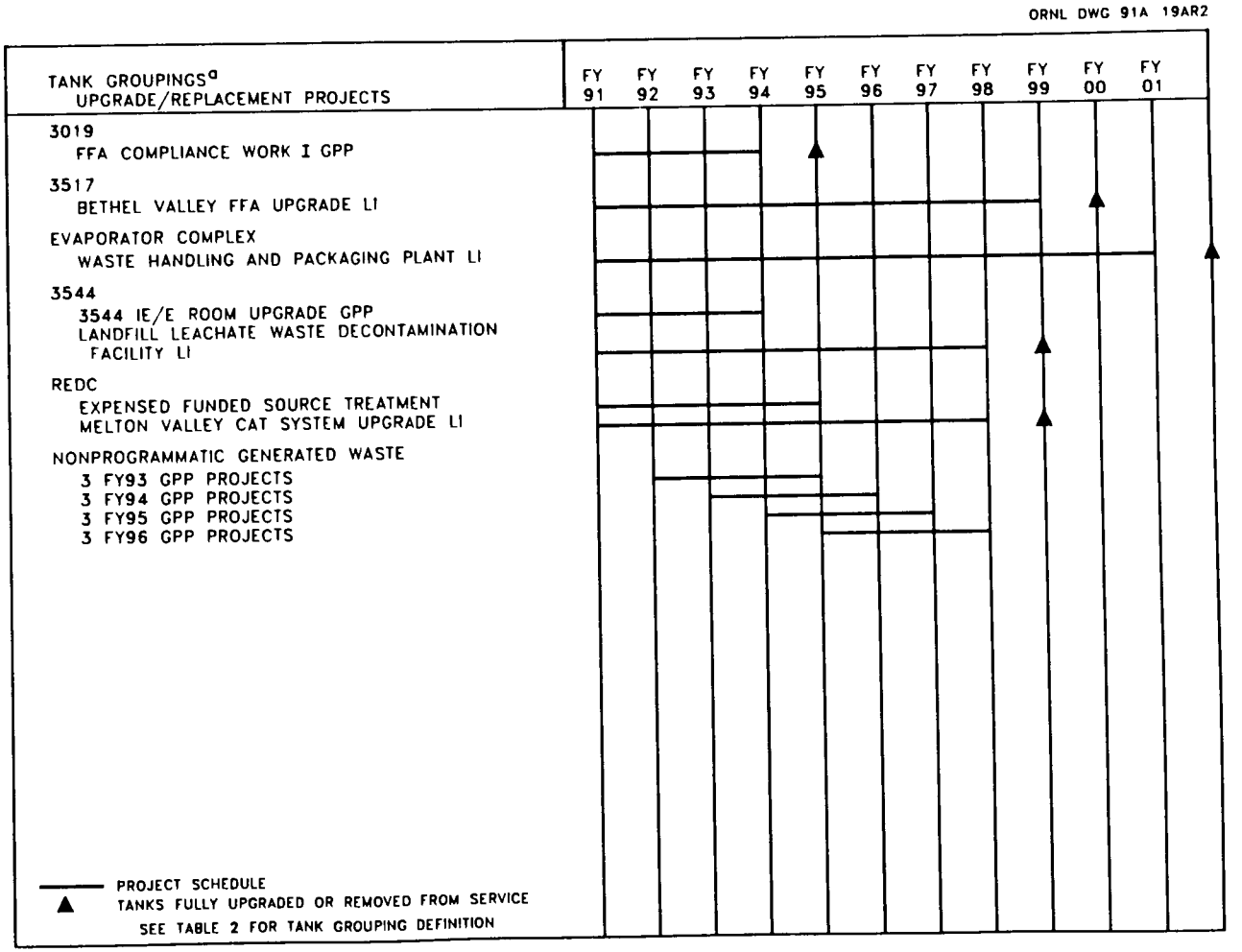

Fig 5 FFA implementation schedule by affected areas (continued)

7 PROBLEMS AND CONCERNS

The single most significant problem associated with the implementation of the FFA contingency plans and upgrade/replacement projects is lack of funding The existing budget allows implementation of contingency measures for the presently active facilities that will lose access to their LLLW tanks when the FFA becomes effective It does not provide near term contingency plans for programs that do not need LLLW service in FY 1991 but will need LLLW service in the FY 1992 1994 time frame (such as BSR startup and IFSP) It provides limited contingency measures for tanks that may lose LLLW service in the near future when leak tests are performed (such as HFIR REDC and 3025) The budget also only provides limited funding for repairs and contingency measures for systems that may develop leaks or fail ATDs in the future The present level of FFA funding requires that plans and schedules for upgrades and replacement of substandard systems be greatly protracted from what the regulatory authorities may expect (based on information from the FFA response team interface meetings) This could provoke a regulatory backlash that might result in the shut down of a major portion of the existing LLLW services for 5 10 years

Implementation of contingency and upgrade/replacement plans is contingent upon obtaining NEPA approval in a timely manner Many of the contingency and upgrade plans are contingent themselves upon the ability to transport waste from the local generator site to the central waste treatment system via bottling or tanker truck Stricter transportation requirements may disallow these options Many contingency plans will increase worker exposure and the likelihood of accidents and/or spills Increased ALARA and safety requirements may disallow these options The implementation plans also assume that several capital projects not directly related to the FFA will be implemented on schedule to upgrade portions of the liquid waste system The Bethel Valley CAT System Upgrade and Melton Valley CAT System Upgrade Line Items are needed to replace certain portions of the LLW system to meet FFA standards The Landfill Leachate Waste Decontamination Facility Line Item is needed to allow adequate treatment/disposal capabilities for newly generated process and solid waste as a result of FFA source treatment projects The Waste Handling Packaging Plant is needed to allow treatment of waste presently located in tanks which will be taken out of service by the

FFA. If these contingency and upgrade/replacement projects are not implemented the LLLW system will be completely shut down and the ORNL will be in violation of the FFA, which could precipitate law suits by EPA.

8. SUMMARY

The FY 1990 1991 planning activities for the FFA contingency and upgrade/replacement projects for the ORNL LLLW system are summarized in this report Three scenarios were developed for potentially meeting the FFA requirements They contain trade-offs between costs schedules the types and amounts of leak testing which would be performed on the existing tank systems until replacement systems could be installed and the contingency measures which would be put in place for systems that might be removed from service before replacement systems could be implemented With DOE/ORO s guidance, one of the three cases was selected for submission to the regulators in the FFA deliverables documents

This intermediate compliance case was developed in an attempt to provide uninterrupted LLLW services in an economical manner to all facilities that have long term programs generating LLLW waste It is assumed that the storage tanks in the central waste management system (evaporator complex and MVST) meet FFA leak detection and secondary containment requirements and that no contingency measures or upgrades are needed Permanent LLLW system replacements will be provided for 3019 3047 4501 3025 and facilities covered by the original scope of the Bethel Valley and Melton Valley CAT System Upgrade Line Item projects Bottling and trucking stations will be installed for the 4500 area and portions of the 3000 area Source treatment/pretreatment will be installed for the ORR/BSR HFIR and REDC It is assumed that tank systems can be used for near term one time decontamination (1991 1995) that is IFSP without performing upgrades and that ES&H tanks can be used without performing upgrades until they are replaced Long term LLLW services will not be provided for Isotopes Circle the New Hydrofracture Facility and most of the 3000 area complex. LLLW service may not be provided for decontamination and decommissioning of surplus facilities

The intermediate compliance case focuses on permanent upgrade/replacement

projects and provides only limited support for contingency plans Therefore several areas of ORNL may lose temporary (5 10 years) LLLW service if the regulators do not approve the proposed FFA implementation plan or if the systems fail leak tests

The contingency and upgrade/replacement plans described in this report will be constantly evolving Most projects described in this report are still in the planning phases The scopes and schedules of the projects will be modified to reflect feedback from the regulators on the FFA deliverable documents Further the contingency plans will also change in an attempt to provide uninterrupted LLLW service to the generators as the tank system leak testing methods and schedules are developed since failure of leak tests will shut down the system The scopes, cost estimates and schedules are also subject to change as project details are developed the detailed cost estimates are completed and yearly budgets are finalized

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