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7. Abstract

Recommended outcome of the reevaluation for implementing greater efficiency with Project W-236A (Multi-Function Waste Tank Facility) and Project W-058's (Cross Site Transfer Line) interfaces.

8. RELEASE STAMP

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RECOMMENDATION ON CHANGING INTERFACES OF W-058 AND W-236A

September 13, 1994

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Executive Summary

With the relocation of the Project W-236A tank farm to its current location west of the 200-East Area, the integration of the Project W-058 cross-site transfer line with the W-236A tank farm was reevaluated. This report outlines the results of this reevaluation and makes the following recommendations.

Pipeline Reroute

It is recommended that W-058's pipeline be rerouted to utilize the W-236A transfer pit and that provisions be made to facilitate the installation of a new pump in diversion box 3 of W-058. This pipeline reroute includes combining the W-058 diversion box 2 with the W-236A diversion box in the 200-East Area tank farm (called the MWTF transfer pit) and control systems. This results in a more functional system while eliminating W-058 diversion box 2, along with its pumps and associated equipment. The above-described changes allow both projects to maintain their intended functions.

Pump Configuration

Diversion box 3 will be designed for future installation of a pump. The decision to purchase and install the pump either by W-058 or by some future project will be made at the end of W-058 Title II design. The combined W-236A and W-058 diversion box and the new pump design will preclude the need for a pumping station at the vent station. The result is a two-pump station design arrangement. The elimination of the vent station pump reduces the size of the vent station, simplifies the control system, and greatly reduces operating and maintenance life-cycle cost for the isolated location.

Flushing Configuration

A flush pump (backup transfer pump) is required for diversion box 1 and the MWTF booster pump station. A standby power generator and flushing capability are required for the transfer pit and the diversion box 1 location. The flush water tank (dedicated source of flush water) is only required at diversion box 1.

No additional funding is required for either project to implement these recommendations. The proposed changes would delay the current design schedule for W-058 one to three months. The construction schedule is not affected. Cost and schedule information is located in Appendix A.

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List of Appendices

RECOMMENDATIONS FOR CHANGING INTERFACES OF W-058 AND W-236A

1.0 Purpose

This position paper recommends changes to improve the interface between the Cross-Site Transfer System (Project W-058) and the Multi-Function Waste Tank Facility (Project W-236A) to handle planned waste retrieval and storage operations. Appendix A includes cost estimates and schedule impacts for each project. The cost estimates, schedule impacts, and this position paper will be the basis for writing a change request to formally implement these changes on Project W-236A and Project W-058/W-028.

2.0 Background and Mission Requirements

The Tank Waste Remediation System (TWRS) Program was established in 1991 to safely manage and immobilize for disposal the highly radioactive tank wastes stored at the Hanford Site. Over the past four years, the plans for implementing this Program have changed and a different technical strategy has evolved.[1]

The TWRS Program mission is still to "...store, treat, and immobilize highly radioactive Hanford waste in an environmentally sound, safe, and cost-effective manner." For tank waste, vitrification has been selected as final treatment; grout has been eliminated. The strategy now is to retrieve waste from potentially leaking tanks, to mitigate safety issue tanks, and to treat and store the waste in a compliant safe manner until vitrification (ref 1).

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[1]Washington State Department of Ecology, U.S. Department of Energy, and U.S. Environmental Protection Agency had significant input into the TWRS program methods and schedules via the Hanford Federal Facility Agreement and Consent Order Part 1, Amendment 4, signed January 25, 1994. The overall strategy is discussed in References 1 and 2.

The Construction Projects department convened a team of operations, design, and project personnel to formulate a proposal to more effectively interface W-058 and the new tank storage of W-236A tank farm in the 200-East Area.

The recommendations in this paper are consistent with the TWRS mission and the TWRS Functions and Requirements Document (ref 2). Appendix B cross-references the TWRS Functions and Requirements Document to W-058 and W-236A technical provisions.

3.0 Considerations and Recommendations

As stated previously, the scope of the recommendations outlined in this position paper is to reroute W-058's pipeline to utilize the W-236A transfer pit. This will facilitate pumping into and out of the W-236A tanks and optimize flushing and control systems. Another recommendation is to make provisions for a pump to be installed in diversion box 3 of W-058.

3.1 Reroute Transfer Line

With the relocation of the W-236A tank farm to the current location east of the 200-East Area, the integration of the W-058 cross-site transfer line with the W-236A tank farm was reevaluated. The tie-in point stated in the Title I Design Report for W-236A tank farm was W-058 diversion box 2 (see Figure 1). The location of diversion box 2 is no longer hydraulically compatible for the positive back draining of the connecting line.

Several options were reviewed and it was determined that a suitable location for diversion box 2A was 5,000 feet southwest of the Title 1 diversion box 2 location. Diversion box 2A, although effective from the W-058 perspective, was not the optimal system from an integrated approach. The W-236A project would require 4,600 feet of additional pipe for each of four lines, a diversion box with booster pumps to pump through diversion box 2A, and a separate control system integrated to Project W-058.

The optimal W-058/W-236 integrated approach identified is to reroute the cross-site line to run adjacent to W-236A and to combine diversion box 2 with the W-236A diversion box and control systems. This results in a more functional, maintainable, and operable system while eliminating a diversion box with pumps and associated equipment. At the same time, both projects still retain their intended functions.

3.2 Pump Configuration

Due to nonresponsive bids for the transfer pumps, a study analysis session was performed, and a revised pump design was identified. The revised design is an industry standard horizontal split-case, multistage centrifugal pump. These pumps are contact maintainable and are less expensive to procure. With the combined W-236A and W-058 diversion box and the new pump design (operating at a higher pressure), a pumping station at the vent station is no longer required. The result is a two-pump station design arrangement to pump from 200 West to 200 East, while retaining the option to install a booster pump in diversion box 3 to pump from the east tank farms in the west direction to the W-236A location. The elimination of the vent station pump reduces the size of the vent station, simplifies the control system, and greatly reduces operating and maintenance life-cycle costs for the isolated location.

3.3 Flushing Configuration

With the elimination of the vent station pump, the proposed flushing system design at the vent station was also re-reviewed. The flush pumps are required to operate at the same rate and pressure as the slurry transfer to prevent settling. This results in having a large capacity pump. With the elimination of a pumping station at the vent station, it is no longer practical to maintain a standby flush system at the vent station. Therefore, the optimal location for maintenance and operations of the flush stations is at diversion box 2/W-236A transfer pit and diversion box 1.

With the flush system at a diversion box with the transfer pumps, the most efficient system is to use the same pump used for the transfer pump. Diversion box 2 was eliminated because it would require valving to flush both directions. Since the preference is to have a pump large enough to flush at the same rate and

pressure as a transfer, the same pump should be used. It was also determined that by using the same pump as the transfer pump (and if it were designed to be parallel), the reliability of the slurry pumping system would be enhanced because the flush pump would also act as a backup transfer pump. This requires a flush pump (backup transfer pump) at both diversion box 1 and the W-236A transfer pit. A standby power generator is required at both locations. The flush water tank (dedicated source of flush water) is only required at diversion box 1.

3.4 East to West Booster Pump

East-to-west slurry pumping capability in the 200-East Area is not currently included in projects W-058 or W-236A. Either larger pumps would have to be installed in several of the existing 200-East Area tanks, or a booster pump would have to be provided. The larger pumps would not be as cost-effective as the booster pump.

The location of the booster pump to facilitate east to west transfer within the 200-East Area was reviewed. The most cost-effective location is in W-058 diversion box 3. The other locations reviewed were either in existing boxes, which are cost prohibitive to work in, or in a newly constructed box solely for the booster pump. Since the pump would not be required until the year 2003, the pump design would be included in the diversion box layout, but the decision (made by TWRS Programs) to purchase and install the pump would not be made until the end of Title II design on W-058. Back flushing capability would be from the W-236A flush station and W-236A transfer pit flush pump.

3.5 W-058/W-028 Scope Changes

The proposed scope changes were intentionally divided between projects W-058 and W-236A to result in the least cost and schedule impacts to both projects. Since the W-236A transfer pit/diversion box 2 and associated equipment (booster pump, flush pump, etc.) is used by both projects, the proposed scope could have been included in either project; however, it has been included in W-236A.

The following is a summary of the changes proposed for the cross-site transfer system and aging waste transfer line:

- Reroute the W-058/W-028 pipelines to the W-236A East tank farm to use W-236A transfer pit (additional length of pipe required).
- Delete diversion box 2 and associated pump.
- Delete pump for the vent station.
- Design diversion box 3 to accept a pump for future installation to allow slurry transfer east to west within the 200-East Area.

By the end of the Title II for W-058, the systems engineering studies should be at a stage to confirm or deny the need for a pump in diversion box 3.

3.6 W-236A Scope Changes

The following is a summary of the changes proposed for W-236A:

- Provide booster pump and flush capability in W-236A transfer pit.
- Provide seismic switch in the W-236A transfer pit.
- Delete piping from W-236A to W-058 diversion box 2.
- Provide power and control location at 200 West for W-058.
- Provide power and control location at W-236A transfer pit in 200 East.
- Provide backup power for W-058 diversion box 1 and W-236A transfer pit.

See Appendix C for an illustration and further discussion of the recommended configuration. See Appendix D for related studies outside the scope of the paper.

4.0 Benefits and Risks

Modifying interfaces of W-058 and W-236A has the following benefits and risks:

Benefits

1. Reduces a total of 18,000 feet of transfer lines.

2. Permits full use of the new W-236A tanks. If needed, a pump in diversion box 3 will permit transfer of waste from the A Farm Complex back to the

W-236A 200-East tank farm. Previously this capability was not available. Current waste tank planning (ref 4) designates that a portion of waste from the AN tank farm will be received into one of the W-236A East Area tanks (the tanks are designated HN). Diversion box 3 will be designed to accept a pump, and the decision to install will be made prior to Title II completion.

3. Provides transfer flexibility to support future operations.

4. Utilizes the same power source and control areas.

5. Reduces cost of outyear project W-314. Pumping capacity for that project would need to be provided only to diversion box 3.

6. Requires no additional funding for validated projects W-058/W-028 or W-236A.

Risk of Implementing the Change

There are some scenarios being evaluated that could delay or cancel the W-236A tanks. If there is a delay of one year or less, there is no cost risk. If the project is canceled, there would be a cost of $1.2 million for W-058 to pick up needed scope at that time.

Risks of Not Implementing this Change

A separate change request will be made in FY 95 to add diversion box 2A and a pump to the scope of W-058. A control room trailer, independent backup power, and instrument air would also be required.

The scope of Project W-314 would be increased from the current scope to provide booster pump capability from the 200-East Area to W-236A or the vitrification plants.

5.0 Contingency Plan

The results of the scenarios being evaluated that could delay W-236A or cancel W-236A are listed below. The integration of W-058/W-028 and W-236A as outlined in this paper can go forward with minimal risk, even if either one of the two scenarios are implemented.

5.1 W-236A Delay

If Project W-236A is delayed by less than one year, the integration scopes of the proposal can proceed as written. However, replanning will be completed as follows:

1. Project W-236A will prioritize the design and construction of the W-236A transfer pit so that construction can be coordinated with Project W-058 construction activities. This will allow the W-236A transfer pit to be constructed first to support W-058.

2. Project W-236A will prioritize the design and construction of the 200-West control building and the power source/backup power to be available by completion of Project W-058 construction activities.

5.2 W-236A Cancellation

If Project W-236A 200-East Area tanks are canceled, Project W-058 will assume the scope previously provided by W-236A and delete the scope that was specific to W-236A. The specific items are as follows:

1. W-058 diversion box 1 pump will handle the majority of the waste transfers between 200 West and 200 East. However, to ensure full capability of W-058 is maintained, W-058 will continue the W-236A design and will construct it as W-058 diversion box 2 at an additional cost of $600K.

2. Seismic shutdown switches will be required for diversion box 2 at a cost of $550K.

3. W-058 will design and construct a new power source and provide the required backup power. Completion of this activity will require $200K.

4. W-058 will design, purchase, and set up a temporary control trailer with power for diversion box 1. The trailer will provide a temporary operation station until Project W-314 establishes an integrated control building. Purchase and setup of the control trailer is estimated at $150K.

5. W-058 will eliminate the third line between W-058 diversion box 2 and W-028 diversion box 1 that was to provide sufficient capacity for simultaneous transfers to and from W-236A. The piping material and installation, which includes indirect, contingency, and escalation, is a $300K reduction in cost if the third line is eliminated.

W-058 would make modifications as discussed at a net increase of $1.2 million.

6.0 References

1. TWRS Technical Strategy, W.T. Alumkal, February 1994.

2. DOE/RL 92-60, Rev. 1, TWRS Functions and Requirements Document, Department of Energy (Draft), March 1994.

3. WHC-SD-WM-ER-193, DST/SST Retrieval Sequence, L.S. Williams, August 1994 (draft).

4. Site Evaluation Alternative Layouts Study, TWRS Master Site Plan, WHC/Fluor Daniel, August 8, 1994.

5. Hanford Federal Facility Agreement and Consent Order Part 1, Amendment 4, January 25, 1994.

APPENDIX A

COST AND SCHEDULE INFORMATION

W236 MULTI - FUNCTION WASTE TANK FACILITY

REVISED ESTIMATE CONSIDERING
W-058 INTERFACE RECOMMENDATIONS

WBS	DESCRIPTION	W236A TITLE I TOTAL EST	W236SGDE Revised 236A East Estimate TOTAL	W236SGDW Revised 236A West Estimate TOTAL	W236SGD1 Revised Combined Estimate TOTAL	Delta Adders or (savings) DELTA	NOTES
332110	TANK DESIGN/CONST SPEC	601,006	602,297	0	602,297	1,291	
333230	SF/TF COMP - MECHANICAL - 200W	3,365,701	3,342,144	0	3,342,144	(23,557)	
333250	SF/TF COMPLETION - ELEC/INST	2,685,727	2,778,616	0	2,778,616	92,889	
333310	SF/TF COMPLETION - STRUCTURAL	1,625,154	1,567,015	0	1,567,015	(58,139)	
333330	SF/TF COMPLETION - MECHANICAL	4,854,306	4,841,234	0	4,841,234	(13,072)	
333350	SF/TF COMPLETION - ELEC/INST	3,284,636	3,312,569	0	3,312,569	27,933	
333390	SF/TF COMP - JUMPERS - 200E	2,068,975	2,040,579	0	2,040,579	(28,396)	
4311L0	MULTI-TANK TRANSFER PIT	83,734	11,542	0	11,542	(72,192)	1
4313AA	PW DIV BOX NO2 TO MT SFR PIT	4,433,196	0	913,182	913,182	(3,520,014)	
4313AB	PW MT XFR PIT TO VALVE PIT	153,440	204,755	0	204,755	51,315	2
4313BG	PIT VENTILATION	2,924,404	1,788,934	1,080,887	2,869,821	(54,583)	
4313BH	PORTABLE VENT	411,161	241,816	152,039	393,855	(17,306)	
4313DI	DRAINS-NEW DIV BOX 2 - TK-103		363,647	0	363,647	363,647	3
4313FJ	MULTI-TANK TRANSFER PIT	78,944	74,681	0	74,681	(4,263)	
4313FK	DISTRIBUTION PIT #2	71,420	0	35,312	35,312	(36,108)	4
4313GJ	MULTI-TANK TRANSFER PIT	24,052	0	0	0	(24,052)	5
4313GK	DISTRIBUTION PIT #2	42,272	0	0	0	(42,272)	5
4313HJ	MULTI-TANK TRANSFER PIT	9,475	7,556	0	7,556	(1,919)	
4313HK	DISTRIBUTION PIT #2	4,933	0	2,369	2,369	(2,564)	4
4313J2	INSTR AIR UTILITY	86,396	108,568	31,831	140,399	54,003	
4313J3	FLUSH UTILITY	80,544	105,152	29,783	134,935	54,391	
4314E0	TANK FARM EM POWER		516,682	516,682	1,033,364	1,033,364	
	PROJECT SUBTOTAL	434,628,752				(2,219,604)	
	COST ADJUSTMENTS FROM W-058	TITLE I ESTIMATE DATED 1/17/94				3,140,000	6
	REVISED PROJECT DELTA					920,396	
	TITLE I ESTIMATE TOTAL					434,628,752	
	REVISED PROJECT TOTAL					435,549,148	

NOTES:
1. COST FOR 200E EMBEDS IN NEW DIV BOX 2
2. PIT LOCATIONS MOVED
3. ADDED
4. 200E NOZZLES IN MT TFR PIT ABOVE
5. JUMPERS AS REQ'D IN W-058
6. SEE PROJECT W-058 FOR DETAILS

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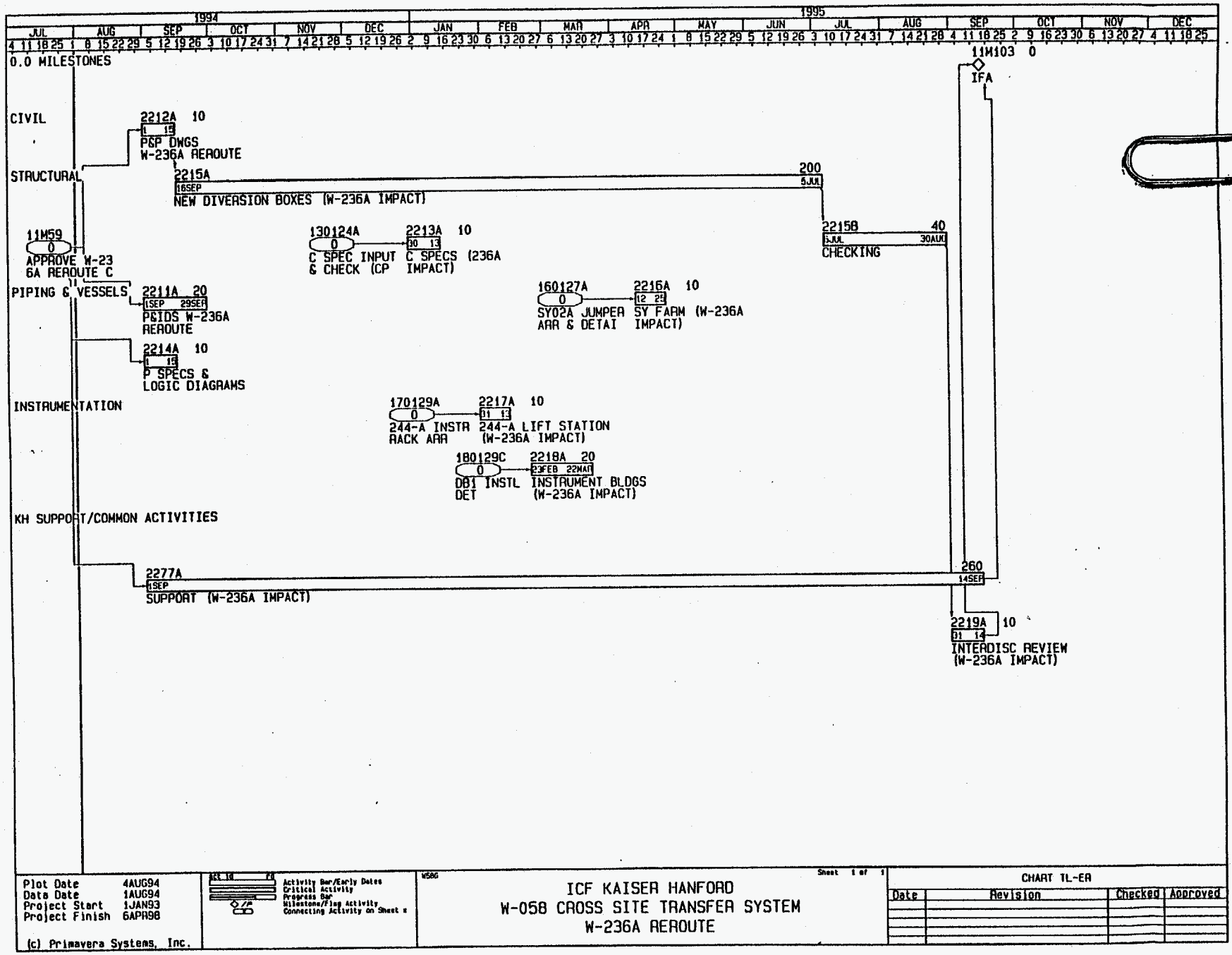

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APPENDIX B

CROSS REFERENCES TO TWRS FUNCTIONS AND REQUIREMENTS DOCUMENT AND W-058 AND W-236A PROVISIONS

WASTE STORAGE FUNCTION REQUIREMENTS (DOE/RL-92-60 Rev 1) CROSS-REFERENCED TO PROJECT W-236A FUNCTIONAL DESIGN CRITERIA AND SUPPLEMENTAL DESIGN REQUIREMENTS

STORE WASTE REQUIREMENTS					
Function ID	**F&R Req.**	**F&R Requirements Description**	**FDC Sec./Para.**	**SDRD sec.**	**Comments**
4.2.1.1	P1	Tank Waste Composition compatible with OSD-T-151-00007 (OSD-T-151-00007)	Table 1		Use of carbon steel tanks requires meeting this OSD requirement
4.2.1.1	C1	Hazardous Waste Operations and Emergency Response. [29CFR1910.120(b)(1), (c)(3), and (7)]	N/A	N/A	Administrative requirement for tank farm operations.
4.2.1.1	C2	Air emissions less than 10 mrem/yr to public (40CFR61.92)	5.2.2/1		Actual emissions will be less than approximately 0.00015 mr/yr
4.2.1.1	C3	Design and install a permanent mixer pump in Tank 101-SY by March 1995 [DOE Secretary Direction B.2.A.5]	N/A	N/A	Does not apply to the new W-236A tanks. W-236A tanks will contain mixer pumps.
4.2.1.1	C4	Provide vapor monitoring equipment with alarm capability when warranted.	3.1		The W-236A design will include an installed gas monitoring system.
4.2.1.1	C5	Close Ferrocyanide USQ by January 1994. [DOE Secretary Direction B.2.A.16]	N/A	N/A	Does not apply to the new W-236A tanks.
4.2.1.1	C6	Complete installation of new temperature monitoring systems in ferrocyandie an organic tanks.	N/A	N/A	Does not apply to the new W-236A tanks.
4.2.1.1	C7	Issue approved criticality safety analysis	N/A	N/A	Does not apply to the new W-236A tanks.
4.2.1.1	C8	Complete contingency cooling test in high-heat tank 106-C	N/A	N/A	Does not apply to the new W-236A tanks.
4.2.1.1	C9	Establish uniform requirements for SARs. [DOE 5481.1B, (1), (l), (4)(c)]	N/A	N/A	W-236A PSAR prepared per DOE 5480.23.
4.2.1.1	C10	USQs	N/A	N/A	Does not apply to the new W-236A tanks.
4.2.1.1	C11	Designs for new storage facilities shall incorporate features to facilitate retrieval capability	2.2.1/3.4.5		The W-236A will utilize a sloped tank bottom to facilitate heel removal, and installed mixer pumps for solids suspension prior to pumping

STORE WASTE REQUIREMENTS					
Function ID	**F&R Req.**	**F&R Requirements Description**	**FDC Sec./Para.**	**SDRD sec.**	**Comments**
4.2.1.1	C12	Waste characteristics and compatibility shall be documented in a SAR.	Appendix A and B		The waste characteristics of the W-236A are defined in the FDC and are also listed in the PSAR.
4.2.1.1	C13	All new waste handling facilities shall be doubly contained (DOE 5820.2A)	2.2 and 3.2.1/3,		The tank and all process waste piping for the W-236A will be doubly contained.
4.2.1.1	C14	Leaking waste storage systems shall not be used. [DOE 5820.2A, Chapter I, 3.b.(2)(c)]	N/A	N/A	Administrative requirement.
4.2.1.1	C15	Secondary containment systems shall be capable of containing liquids that leak into them, and shall be equipped with transfer capability to retrieve the leaked liquid.	2.2, 3.2, and 3.4.9		The material used for the secondary containment in the W-236A is the same as the primary. An annulus pump is provided for the tank, and all piping encasement are self draining.
4.2.1.1	C16	To the extent practical, waste shall be segregated by type (sludge, slat high activity, and low activity) to make accessibility for future processing easier. [DOE 5820.2A, Chapter I, 3.b.(2)(e)]	N/A	N/A	Administrative requirement
4.2.1.1	C17	Where required, ventilation and filtration systems shall be provided to maintain radionuclide releases within guidelines of DOE 5481.1B	3.4.1, 3.4.2, and 4.2		The primary ventilation system contains a number of radionuclide control devices: Condensers, HEMEs, HEMFs, and HEPAs.
4.2.1.1	C18	Facilities using cathodic protection systems shall include engineered features that protect against stray currents	3.2.4		The cathodic protection system will be designed to HPS and NACE criteria.
4.2.1.1	C19	Engineering controls shall be incorporated to provide liquid volume inventory data.	3.1		Liquid level detectors, flow rate meters, and interlocked valves will be utilized in the W-236A to control and monitor waste inventory.
4.2.1.1	C20	Nuclear Criticality safety considerations and controls shall be evaluated for normal operations and, before any significant operational changes are made. [DOE 5820.2A, Chapter I, 3.b.(2)(h)]	5.1.1		

STORE WASTE REQUIREMENTS

Function ID	F&R Req.	F&R Requirements Description	FDC Sec./Para.	SDRD sec.	Comments
4.2.1.1	C21	Facilities shall utilize remote maintenance features to minimize personnel exposure	4.7.2 and 5.1.2		Remote maintenance will be utilized where applicable in the W-236A design. All process pits and cells are designed for remote maintenance.
4.2.1.1	C22	Monitoring and leak detection capability shall be incorporated in the design to provide rapid identification of failed containment.	3.1		Monitoring on the W-236A tanks includes leak detection, liquid and sludge level monitoring, water usage, temperature and pressure.
4.2.1.1	C23	Leak detection systems shall be designed to detect the failure of the primary containment system.	3.1		The W-236A tank will utilize a conductivity type leak detector and CAMs to detect tank leaks. Conductivity type leak detectors (low point, of continuous tape) will be utilized in the process piping systems.
4.2.1.1	C24	A method for periodically assessing waste storage system integrity (e.g. corrosion coupons, photographic inspections, etc.)shall be established, documented,and reported as required in the Waste Management Plan. [DOE 5820.2A, Chapter I, 3.b.(3)(c)]	3.1/3, and 3.4.3		W-236A will utilize corrosion coupons, corrosion probes, leak detectors, and In-Service Inspection equipment.
4.2.1.1	C25	Leak detection devices shall be provided with B/U power.	4.5.4		Backup power will be provided to the W-236A for all SC 1 and 2 loads, including leak detection.
4.2.1.1	C26	Contingency actions.	N/A	N/A	Administrative requirement.
4.2.1.1	C27	The chemistry of liquid high-level waste shall be adjusted to control corrosion within design limits for the storage system. [DOE 5820.2A, Chapter I, 3.b.(7)(c)]	N/A	N/A	This is an administrative requirement. However, the W-236A contains sampling and chemical addition facilities for performing this.
4.2.1.1	C28	Treatment reagents shall not be placed in a tank system without proven effective mitigative action ... [DOE 5820.2A, Chapter I, 3.b.(7)(d)]	N/A	N/A	Administrative requirement.
4.2.1.1	C29	Waste generation and waste management systems that significantly change the chemical and physical forms of the waste ...	N/A	N/A	Administrative requirement.
4.2.1.1	C30	Singly contained tank systems shall not be used to store fresh high-level waste from fuel reprocessing operations ...	N/A	N/A	Administrative requirement.

STORE WASTE REQUIREMENTS					
Function ID	**F&R Req.**	**F&R Requirements Description**	**FDC Sec./Para.**	**SDRD sec.**	**Comments**
4.2.1.1	C31	Storage and transfer operations shall be conducted within the limits defined in the Safety Analysis Reports ...	N/A	N/A	Administrative requirement.
4.2.1.1	C32	Engineered systems shall be utilized to provide waste volume inventory data.	3.1		Liquid level sensors, flow meter monitoring of all streams into and out of the tanks, and the DCS system will be used to support this requirement.
4.2.1.1	C33	Nuclear criticality safety	5.1.1		
4.2.1.1	C34	See C21 above			
4.2.1.1	C35	See C23 above			
4.2.1.1	C36	A method for periodically assessing waste storage tank integrity shall be established and documented.	2.2.1 and 3.1		Corrosion monitoring, corrosion coupons, and in-service inspection will all be utilized in the W-236A for assessing storage tank integrity.
4.2.1.1	C37	Emergency power. [DOE 5820.2A, Chapter I, 3.c.(3)(c)]	4.5.4		Emergency diesels and UPSs will be utilized for backup power.
4.2.1.1	C38	Contingency action plans for leaks and spills and other credible emergencies. [DOE 5820.2A, Chapter I, 3.c(4)]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C39	Other waste. High-level waste that is not readily retrievable shall be monitored periodically in site. Field offices shall reevaluate the safety of such waste to determine the need for corrective measures as necessary [DOE 5820.2A, Chapter I, 3.d(2)]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C40	Waste acceptance criteria shall be established for each low-level waste treatment , storage, and disposal facility, and submitted to the cognizant field organization.	N/A	N/A	The W-236A is a high-level waste storage facility.
4.2.1.1	C41	Storage of waste to allow for nuclides to decay or storage of wastes until they can be disposed of by approved methods are acceptable.	N/A	N/A	Administrative requirement not related to design.

STORE WASTE REQUIREMENTS					
Function ID	**F&R Req.**	**F&R Requirements Description**	**FDC Sec./Para.**	**SDRD sec.**	**Comments**
4.2.1.1	C42	Environmental monitoring.	N/A	N/A	Site wide requirement not related to design of the W-236A facility. Includes site groundwater monitoring and ambient air monitoring. Investigating whether additional groundwater monitoring wells needed by the project.
4.2.1.1	C43	Identification and monitoring of SSTs on the high temperature watch list. {P.L. 101-510 Sec 3137 (a)]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C44	Safety Measures for Hanford Waste Tanks. [P.L. 101-510 Sec 3137 (b)]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C45	Prohibition of adding waste to any watchlist tanks. [P.L. 101-510 Sec 3137 (c)]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C46	Plans to promote tank safety. [P.L. 101-510 Sec 3137 (d)]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C47	Identify those tanks which may have potential for serious release of high level waste. [P.P. 101-510 Sec 3137 (1-2)	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C48	June 1994. Complete DST Interim Status Tank Actions. [TPA M-32-04]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C49	September 2001. Mitigate/Resolve Tanks Safety Issues for High Priority Watch List Tanks. [TPA M-40-00]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C50	March 1994. Complete Tank 241-SY-101 Low Speed Mixer Pump Test. [TPA M40-01}	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C51	April 1995. Upgrade temperature monitoring capabilities in ferrocyanide tanks. [TPA M-40-02]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C52	September 1994. Develop criteria for upgraded temperature monitoring capabilities in ferrocyanide tanks. [TPA M-40-02A]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C53	September 1994. Install six of twelve new thermocouple trees. [TPA M-40-02B]	N/A	N/A	Administrative requirement not related to design.

STORE WASTE REQUIREMENTS					
Function ID	**F&R Req.**	**F&R Requirements Description**	**FDC Sec./Para.**	**SDRD sec.**	**Comments**
4.2.1.1	C54	September 1995. Conduct Safety Alternative test in high-heat tank C-106. [TPA M-40-05]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C55	June 1995. Commence operation of a vapor treatment system in tank C-103. [TPA M-40-07]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C56	September 1998. Close all USQ for SSTs and DSTs. [TPA M-40-07]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C57	January 1997. Complete vapor space monitoring for all Flammable Gas Tanks. [TPA M-40-10]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C58	June 1994. Close the USQ for the criticality Issue. [TPA M-40-11]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C59	September 1999. Resolve Nuclear criticality safety issue. [TPA M-40-12]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C60	July 1994. Document 100% design completion of permanent mitigation pump for 101-SY [TPA M-40-13]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C61	March 1994. Close ferrocyanide USQ. [TPA M-40-14]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C62	September 1994. Install gas monitoring equipment in the remaining five potentially flammable DSTs	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C63	March 1994. Complete sampling and safety evaluation of 103-C. [TPA M-40-16]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C64	May 1994. Close tank103-C USQ. [TPA M-40-17]	N/A	N/A	Administrative requirement not related to design.

STORE WASTE REQUIREMENTS					
Function ID	**F&R Req.**	**F&R Requirements Description**	**FDC Sec./Para.**	**SDRD sec.**	**Comments**
4.2.1.1	C65	September 2000. Complete SST interim stabilization. [TPA M-41-00]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C66	August 1994. Start to interim stabilize an additional 3 SSTs. [TPA M-41-01]	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C67	December 1994. Complete safety studies and analysis on interim stabilization of watchlist tanks.	N/A	N/A	Administrative requirement not related to design.
4.2.1.1	C68	Provide additional DST capacity	All	All	This project satisfies this requirement on a schedule consistent with the TPA milestones.
4.2.1.1	C69	June 2005. Complete Tank Farm Upgrades	N/A	N/A	Does not relate to W-236A
4.2.1.1	C70	Project W-030 Tank Farm Ventilation Upgrades	N/A	N/A	Does not relate to W-236A
4.2.1.1	C71	June 2002 Project W-314B DST Ventilation Upgrade	N/A	N/A	Does not relate to W-236A
4.2.1.1	C72	March 1997. Provide WDOE and WDOH the results of the SST ventilation upgrades needs analysis.	N/A	N/A	Does not relate to W-236A
4.2.1.1	C73	June 2002 Project W-314A Tank Farm Integrated Instrumentation System Upgrade.	N/A	N/A	Does not relate to W-236A
4.2.1.1	C74	June 2005. Complete project W-314D Tank Farm Electrical Upgrade.	N/A	N/A	Does not relate to W-236A
4.2.1.1	C75	September 1994. DST space evaluation (annually thereafter)	N/A	N/A	Does not relate to W-236A
4.2.1.1	C76	Response to DNFSB recommendation 90-7.	N/A	N/A	Does not relate to W-236A

WASTE TRANSFER FUNCTION REQUIREMENTS (DOE/RL-92-60 Rev 1) CROSS-REFERENCED TO PROJECT W-058 REPLACEMENT OF CROSS-SITE TRANSFER SYSTEM

Function ID	Function Requirement Descriptions	*FDC Sec./Para.	**Title I Sec./Para.	Comments
A. PERFORMANCE REQUIREMENTS				
4.2.1.4 P1	Underground Storage Tanks Specification (Corrosion Control).	3.3/1st	(IV)D.2/Table 1	Reference OSD-T-151-0007. The FDC and Title I design pH range for corrosion control is more conservative than that specified in the reference document.
B. CONSTRAINTS				
4.2.1.4 C1	New high-level waste transfer shall be doubly contained.	3.4/1st	(II)/1st and (IV)D.2/2nd	Requirement met.
4.2.1.4 C2	Singly contained pipelines may be used for liquid waste that has radioactivity concentration less than 0.05 Ci/gal.	Not Applicable		Project W-058 FDC radioactive concentration is greater than 0.05 Ci/gal limit for singly contained pipelines.
4.2.1.4 C3	Secondary containment shall be equipped with transfer capability to retrieve the leaked liquid.	3.7/2nd	(IV)D.2/4th	Requirement met.
4.2.1.4 C4	Cathodic protection systems shall be calibrated annually.	4.11/1st	(IV)C.2/1st	Inspection and calibration schedule is administrative control which will be done during operation. Therefore, it is outside of Project W-058 scope.
4.2.1.4 C5	Upon loss and subsequent recovery of normal electrical power, high-level waste transfer equipment shall not have the capability to restart without active operator action		(IV)D.1	The cross-site transfer system will be monitored and controlled by a computer-based (Distributed Control System). Therefore, the system restart can be programmed to require an operator action.
4.2.1.4 C6	Leak detection systems shall be designed to detect the failure of the primary containment boundary	1.3/3rd and 3.8.1/2nd	(IV)D.2/8th	Requirement met.
4.2.1.4 C7	Periodically assessing waste storage system integrity	Not Applicable		Assessing waste storage integrity is outside of Project W-058 scope. However, the transfer line system is designed to facilitate testing of the integrity of both primary and secondary pipes via pressure testing (FDC 2.0).

Function ID	Function Requirement Descriptions	*FDC Sec./Para.	**Title I Sec./Para.	Comments
4.2.1.4 C8	Electrical monitoring and leak detection devices shall be provided with backup power, as appropriate, to ensure operability under emergency conditions.	4.3.4/1st	Not discussed	Revised FDC included backup power criteria for safety features. Change Request CR-058-029 was approved for the seismic shutdown switch connect to backup power.
4.2.1.4 C9	Contingency Actions (a) Failure of the secondary containment shall be remove from service until conditions can be evaluated fully. (b) Prevent further migration of the release to soil or surface water. (c) If the integrity of the system is not damaged, the system may be returned to service when the corrected condition is completed. (d) Adequate transfer pipelines shall be maintained in operation for largest volume in any one tank during emergency situation. (e) A schedule and procedure shall be developed for monitoring, surveillance, and calibration checks. (f) Prepare response procedures for credible emergencies.	Not Applicable		Outside of Project W-058 scope since all contingency actions are required during system operation. Note: Transfer pumps will stop when primary containment is breached. The containments are also tested periodically as part of the preventive maintenance program.
4.2.1.4 C10	Treatment reagents shall not be placed in a tank system without proven effective mitigative action.	Not Applicable		Treatment reagents (corrosion) is administrative control per Operating Specifications (OSD-T-151-00007). Note: Project W-058 does not have capability to add treatment reagents.
4.2.1.4 C11	Waste generation and waste management shall be technically assessed to assure compatibility and retrievability.	Not Applicable		Tank Farm waste compatibility guideline (WHC-SD-WM-OCD-015 and WHC-SD-WM-DQO-001) has been written to administrative control compatibility to transfer.
4.2.1.4 C12	Storage and transfer operations shall be conducted within the limits defined in the Safety Analysis Reports according to DOE 5481.1B	Not Applicable		Project W-058 is designed within the specified limits in PSAR (WHC-SD-W058-PSAR-001 Rev. 0). The Double-Shell Tank Farm SAR (WHC-SD WM-SAR-016 Rev. 1) will be revised before the system is put in operation.
4.2.1.4 C13	Each facility shall use remote maintenance features and other appropriate techniques to maintain personnel radiation exposure as low as reasonable achievable.	4.4/3rd and 6th	(VI)E/1st	Project W-058 has flushing capability and selected the diversion box design and piping material to reduce radiation exposure.

Function ID	Function Requirement Descriptions	*FDC Sec./Para.	**Title I Sec./Para.	Comments
4.2.1.4 C14	Storage Operation Contingency Action (spills or leaks, leak mitigation, removal of liquid from singly contained tanks).	Not Applicable		Project W-058 transfer line will not be used to store liquid waste. Thus, outside of project scope.
4.2.1.4 C15	March 1995 emergency leak response: Prepare an improved single-shell tank emergency pumping capability.	Not Applicable		Outside of Project W-058 scope
4.2.1.4 C16	February 1994 -- Issue Request For Proposal for a mobile high-level liquid waste transport cask.	Not Applicable		Outside of Project W-058 scope.
4.2.1.4 C17	Project W-314C Transfer System Upgrades	Not Applicable		Outside of Project W-058 scope.
4.2.1.4 C18	Project W-058 Replacement of Cross-Site Transfer System and completion milestones (complete definitive design, start construction design, complete construction design, and system operational).	FDC in its entirety	Appendix D Proj. Schedule	The project early finish dates as indicated in the Title I met the indicated milestones.

* Brantley, W.M., August 1994, *Function Design Criteria The Replacement of the Cross-Site Transfer System*, WHC-SD-W058-FDC-001, Rev. 2, Westinghouse Hanford Company, Richland.

** Brantley, W.M., Aug 1993, *Title I Design Report, Replacement of the Cross-Site Transfer System, Project W-058*, WHC-SD-W058-DR-001, Rev. 0, Westinghouse Hanford Company, Richland.

APPENDIX C

INTEGRATION STRATEGY AND ILLUSTRATION OF THE RECOMMENDED CONFIGURATION

INTEGRATION STRATEGY

Figure 2 shows how the new tanks and the W-058/W-028 pipeline interface. One assumption with this figure is that the final processing will be located at the Site Alternative 1. However, Site Alternative 2 or 3 could be selected without affecting the recommendations in this paper. The overall plan for integrating these two projects is as follows:

- The third line is required to extend to the W-236A transfer pit only if the pretreatment/vitrification facilities are located near the current location of W-236A East. Otherwise the third line (W-028 Aging Waste Transfer Line) is required only to B-Plant.

- Pumps are intertied for complete redundancy of pumping and piping systems. This includes the ability to pump waste from East Area tanks through 244-A and 151-AR to the west. (See Figure 1).

- Backup power is required to provide flushing in case of loss of normal power or transfer failure.

- Pumps must operate in series for transfer of "worst-case slurry" from 200 West to 200 East. This reduces operating pressure and allows the use of schedule 40 pipe when compared to a "one-pump" system.

- All pumps can be bypassed.

- 200-West single-shell tank wastes are routed through the a West Area double-shell tank farm; i.e. SY tanks and/or W-236A West tanks. The B Farms, which are single-shell tanks, are routed through W-028 diversion box 1. The single-shell tank farms A, AX, and C are routed through W-058 Diversion Box #3.

- Slurry transfers from 200 West to 200 East are possible through the SY valve pits, Project W-211, Initial Tank Retrieval Systems. Project W-211 is providing equipment and upgrades to the SY valve pits, as well as upgrades to eight other double-shell tanks in the A-Farm complex in an effort to relieve these tanks.

- Project W-314, Restoration and Upgrades, provides upgrades to waste transfer lines in the A-Farm Complex. This provides access to needed facilities and tank farms to W-058 diversion box 3 in support of the TWRS mission.

- Power and control location to the W-236A transfer pit and booster pump and flush pump are now from W-236A East.

- A booster pump may be at W-058 diversion box 3. (Decision end of Title II)

- W-058 vent station pump is deleted.

- Power requirements are reduced for W-058.

APPENDIX D

STUDIES ON UPGRADES TO THE A FARM COMPLEX AND DELETION OF B PLANT FEEDLINE

Studies on Upgrades to the A Farm Complex and Deletion of B Plant Feedline (outside scope of this paper)

The purpose of this position paper (TI-004) is to change the interface of the W-236A tank farm and W-058 to be located at the W-236A transfer pit and make provisions for pumping from W-058 diversion box 3 back to the W-236A tank farm. The scope of this paper is limited.

The recommendations in this paper do not affect ongoing studies of internal transfers in the A Farm Complex; they are listed below for information only.

1. Upgrades to the AN Farm could be provided by W-314 to W-058 diversion box 3 for a direct tie between W-058/W-028 and AN. (Project W-314 is currently evaluating this; a determination is expected September 30, 1994).

2. The A Farm Complex currently retains the existing 2-in. lines interconnected to AY-AZ-AN-AW-AP complexes for interfarm transfers until Project W-314 provides upgrades to the A-Farm Complex. (Project W-314 is currently evaluating.)

3. The A Farm Complex currently retains two lines to 151 AR for routes to AY/AZ, but the 241-AR-151 drain may be rerouted to go to 102 AY rather than the 244 AR vault. (W-314 project currently evaluating.)

4. The A Farm Complex currently retains two lines to 244A for tie into existing A Farm Complex transfer systems via A-A and A-B pits. SN-650 goes direct from 102-AP tank pit to 241-A-B valve pit. (W-314 is currently evaluating the condition of 244-A DCRT for its support through the TWRS mission; this evaluation shall be finished by September 30, 1994).

5. The A Farm Complex currently retains existing routes AP-AW-AY-AZ-AN for interfarm transfers. (Project W-314 to upgrade the waste transfer connections.)

6. The line from B Plant to W-028 diversion box 1 may no longer be required for B Plant cleanout. An evaluation is underway; results are expected December 1994.

APPENDIX E

W-058 AND ALTERNATE TWRS SITE INTERFACE

W-058 AND ALTERNATE TWRS SITE INTERFACE

The recommended changes previously listed continue to support the three alternative candidate locations (as shown on Figure 3) for the high-level, low-level vitrification and pretreatment facilities. Depending on which site is the final location, the cross-site transfer system combined with the 200-East Area interfarm transfer system, will continue to provide the means to transfer waste to each location.

Alternative 1 will have provisions to tie into the cross-site transfer line at the W-236A transfer pit. The W-236A location is a shorter distance than the W-058 diversion box 2A location. The majority of the transfers to these facilities will originate from W-236A. The recommended changes will mean lower amounts of preconditioning and cleaning flushes, which results in minimizing waste.

Alternatives 2, 3, or 4 will have provisions to tie into the cross-site transfer line at diversion box 3. This is the same location regardless of the realignment.

Alternative 5 will be beyond a direct connection point to the cross-site transfer line regardless of the realignment. This site would need to be connected through the exiting or new 200 East interfarm transfer systems.

Discussions with the Site Planning organization have confirmed that the realignment will have no impact to any other planned or existing facility. The land to the south of route 3 and north of the existing transfer line has no existing facilities and currently no planned facilities. It is the opinion of Site Planning that the safeguards of the cross-site transfer lien design would not preclude the crossing of the line for access to any future facility.

APPENDIX F

FIGURES

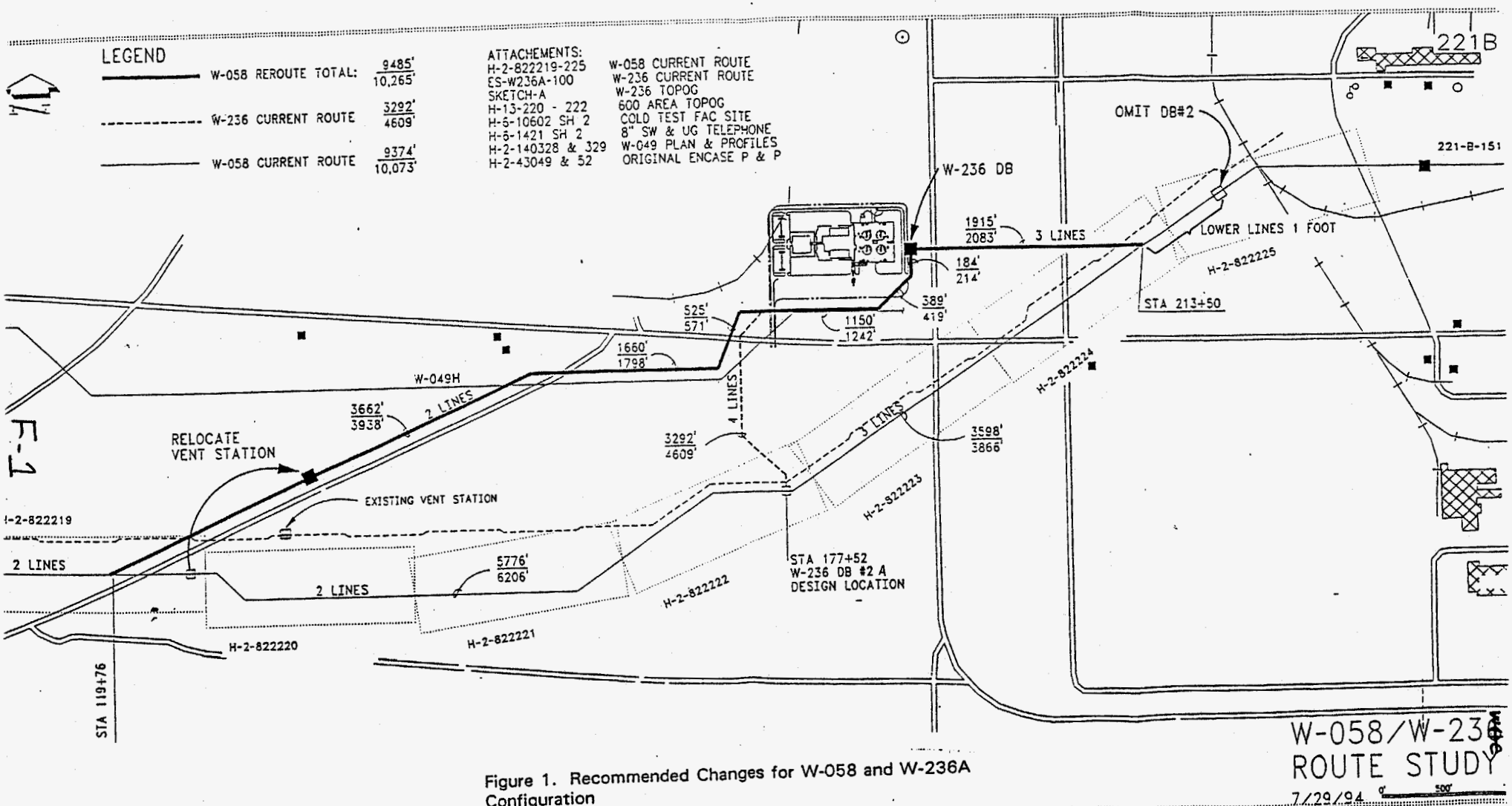


Figure 1. Recommended Changes for W-058 and W-236A Configuration

CF-KH W-058/CIVIL/REROUTE7

HC-50-W236A-TI-004/Rev.0

EXPLANATION OF THE ITEMS ANNOTATED ON FIGURE 2

The following items are referenced on Figure 2.

1. Retrieval projects will tie into SY Farm for all of 200 West single-shell tank T-TX-TY-U-S-SX farms (no change from existing configuration). Project W-211 is doing work at the SY valve pits to provide pumping capability for cross-site transfers.

2. Project W-058 diversion box 1 at W-236A West has booster pumps with W-236A providing power and control location. Either pump can act as a transfer pump or a flush pump for either line. Either pump can be fed by a flush tank and powered by backup power.

3. W-058 vent station (vs) has pump deleted.

4. W-058 diversion box 2 and the W-236A transfer pit become one box with a booster pump and flush pump. W-236A East provides power, control location, and flush. As with diversion box 1, either pump can act as a transfer or a flush pump for either line. Either pump can be fed by a flush tank and powered by backup power. Pumps can provide backup flushing for a third line.

5. W-028 diversion box 1 has single-shell tank retrieval future connection points and B Plant tie in; three lines are retained to W-058 diversion box 3 from this point.

6. W-058 diversion box 3 has single-shell tank future connection points. Booster pump(s) are added at diversion box 3 for pumping to 200 East and 200 West. Pump is provided for 200 East to 200 West transfers within the East Area. In case of transfer failure, pump and piping can be flushed from diversion box 2 (now the W-236A transfer pit).

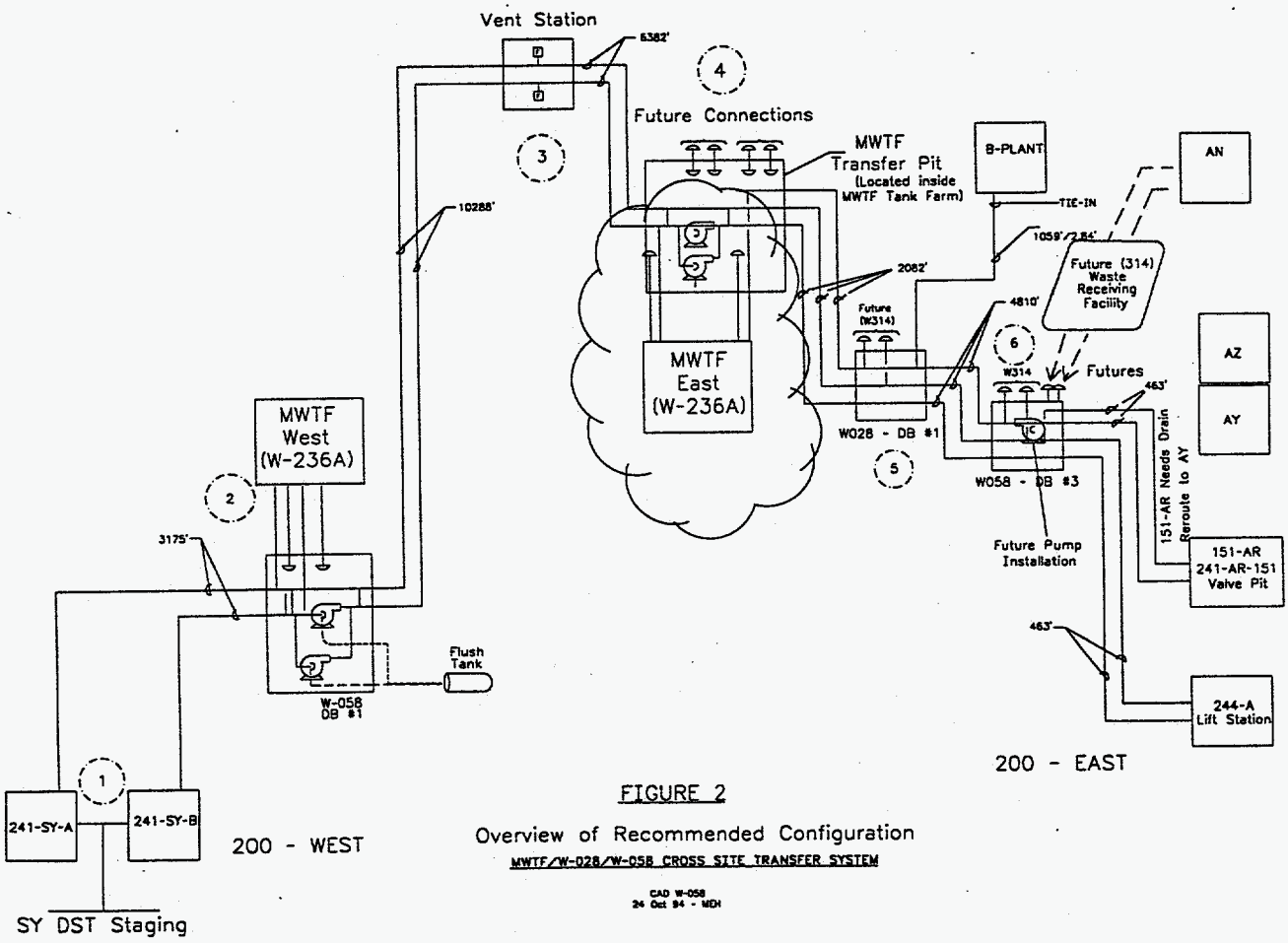
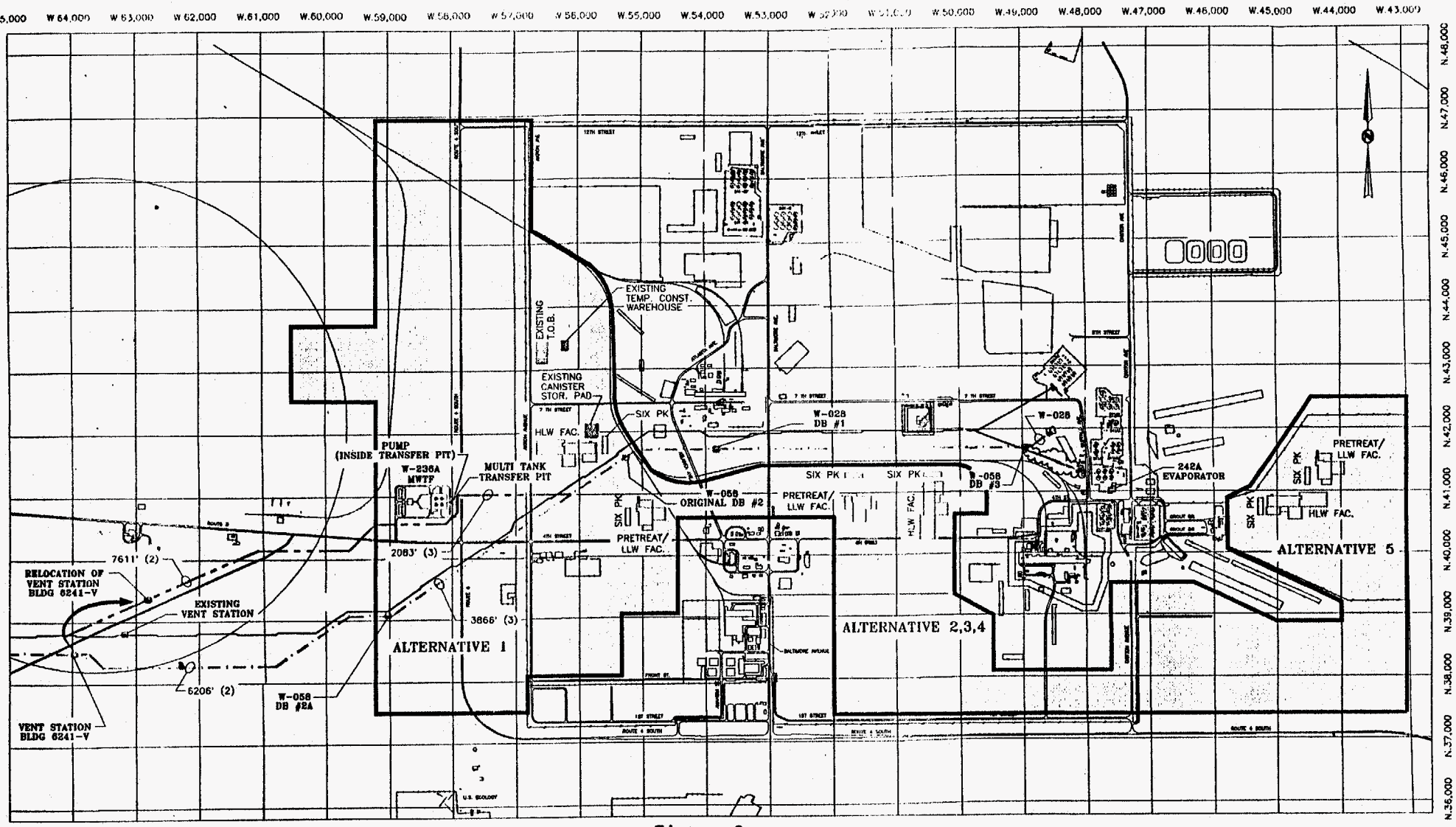


FIGURE 2

Overview of Recommended Configuration

MWTF/W-028/W-058 CROSS SITE TRANSFER SYSTEM

CAD W-058
24 Oct 94 - MDH



E-4

LEGEND

- RECOMMENDED CHANGE FOR W-058 ROUTE
- CURRENT DESIGN FOR W-058
- EXISTING WASTE TRANSFER LINE

Figure 3

CANDIDATE LOCATIONS FOR THE HIGH LEVEL, LOW LEVEL VITRIFICATION, AND PRETREATMENT FACILITIES, 200 EAST AREA

NOTE: AN ALTERNATIVE SITE WILL BE CHOSEN FOR THE LOCATION OF THE LLV, HLV AND PRETREATMENT FACILITIES. THIS DRAWING SHOWS THE ORIENTATIONS OF THE CANDIDATE LOCATIONS WITH REFERENCE TO THE MAIN PROJECTS: (W-236A) MULTI-FUNCTION WASTE TANK FACILITY, (W-058/028) CROSS SITE TRANSFER SYSTEM AND EVAPORATOR 242A.

SITE PLAN

SCALE: 1:26000

0 260 520 1040 1560 2080

1 cm = 260 meters

0 500 2000 4000

1000 3000 5000 FEET

NOTE: THIS MAP IS TO BE USED FOR REFERENCE PURPOSES ONLY. DO NOT USE THIS MAP FOR CONSTRUCTION PURPOSES	ICF Kaiser Hanford Company Mapping Services	CADFILE: ZRBT0252	CUSTOMER: JILL LIGHT	TITLE: 200 EAST TWRS COMPLEX ALTERNATIVE SITES
		DATE: 9-2-94	DRAWN BY: RAFAEL TORRES	

WHC-SD-W236A-TI-004, Rev. 0