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- **Reason for Transmittal (G):**
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  - 3 Disapproved w/comment

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System Description for the Double-Shell Tank Confinement System

H. Rossi
TRW Environmental Systems
Richland WA 99352
U.S. Department of Energy Contract DE-AC06-99RL14047

EDT/ECN 625309  UC 721
Cost Center 6N100  Charge Code
B&R Code  Total Pages 37

Key Words
double-shell tank, DST, confinement

Abstract
This document provides a description of the Double-Shell Tank (DST) Confinement System. This description will provide a basis for developing functional, performance, and test requirements (i.e., subsystem specification), as necessary, for the DST Confinement System.

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SYSTEM DESCRIPTION FOR THE DOUBLE-SHELL TANK CONFINEMENT SYSTEM

January 2000

H. Rossi
Richland, Washington

I. I. Kazmi
Richland, Washington

Prepared for
U.S. Department of Energy
Office of River Protection
Richland, Washington
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<td>Double-Contained Receiver Tank</td>
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<td>DST</td>
<td>Double-Shell Tank</td>
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<tr>
<td>GM</td>
<td>Gas Monitoring</td>
</tr>
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<td>LAW</td>
<td>Low-Activity Waste</td>
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<tr>
<td>M&amp;C</td>
<td>Monitor &amp; Control</td>
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<td>MUST</td>
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<td>PFP</td>
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<td>WSTA</td>
<td>Waste Storage Tank Annulus</td>
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1 0 INTRODUCTION

1 1 DOCUMENT PURPOSE

This document provides a description of the Double-Shell Tank (DST) Confinement System. This description will provide a basis for developing functional, performance, and test requirements (i.e., subsystem specification), as necessary, for the DST Confinement System. This system description fully identifies the equipment and system boundaries of the DST Confinement System.

1 2 EXECUTIVE SUMMARY

The system description of the DST Confinement System presented in this document was developed to establish the boundaries of the DST Confinement System based on the Tank Waste Remediation Architecture Tree (Peck 1999) and the Functional Analysis for DST Subsystems (Smith 1999). This was done to provide a complete and accurate description of the system at the subsystem level.

The DST Confinement System consists of the structures and components that make up the basic DST structure. This includes the tank's primary (inner) shell, secondary (exterior) shell, annulus between the shells, reinforced concrete base, the concrete layer surrounding the secondary liner, risers, riser extensions and other tank penetrations, isolation valves directly attached to risers or in close proximity to risers, concrete pads provided to support pumps, air lift circulators, sensors embedded in the concrete portions of the DST, and leak detection pits. The Confinement System does not include systems components, or equipment attached to or inserted into the DST.

The DST Confinement System is made up of already existing structures and will not require modification, etc., to accomplish the waste confinement function. A formal specification for the DST Confinement System is, therefore, not necessary.
1.3 DOCUMENT ORGANIZATION

The remainder of this document is organized into sections, briefly described as follows:

- Section 2.0 establishes the DST Confinement System as a subsystem of the DST System.
- Section 3.0 discusses the rationale for the DST Confinement System description provided herein.
- Section 4.0 describes the next steps required in the engineering process for the DST Confinement System.
- Section 5.0 lists the documents referenced within this document.
20 BACKGROUND

The *System Specification for the Double-Shell Tank System* (Grenard et al. 1998) established DST System functions, system-level requirements and interfaces applicable to the first phase (Phase 1) of the River Protection Project (RPP) mission described in the *Tank Waste Remediation System Mission Analysis Report* (Acree 1998). The purpose for the DST System, according to the DST System Specification, is to receive, store and treat (prepare) waste, and to transfer it to the Phase 1 Privatization Contractor, as shown in the DST System Functional Flow Block Diagram (Figure 2 0-1).

The waste stored in the DSTs as part of the described waste storage function includes tank waste already in the DSTs, waste received from the Single-Shell Tank (SST) System and other onsite generators. The flow of waste in and out of the DST System is shown in the DST Interface Diagram (Figure 2 0-2). Specifically, the DST Specification established functions to "Store Waste in East Area DSTs" and to "Store Waste in West Area DSTs".

A DST Storage System architecture to accomplish the waste storage functions was established in the *Tank Waste Remediation System Architecture Tree* (Peck 1999) (see Figure 2 0-3). As shown in Figure 2 0-3, the DST Waste Storage System architecture was further decomposed to include architectures for a DST Ventilation System and a DST Confinement System.
Figure 2-0-1 Double-Shell Tank System Functional Flow Block Diagram  (Sheet 1 of 2)
Figure 2.0-1  Double-Shell Tank System Functional Flow Block Diagram  (Sheet 2 of 2)

DST = double shell tank.
HLW = high level waste
LAW = low activity waste
PFP = Plutonium Finishing Plant

Note: 1) Store Waste Functions are multi-mode and are performed continuously.
Figure 20-2  Double-Shell Tank System Interface Diagram

242A Evaporator

Dilute Waste*  Concentrated Waste*

New Waste*

Electricty

Water

Retrieved Waste*

Supemainten for Shiceng*

SST System

Waste Samples*  Waste*

222 S Laboratory

Central Plateau Electrical System

Central Plateau Water System

LAW/HLW Plant, Phase 1

Central Waste Complex

Non TWRS Major Facility

TWRS Major Facility

*Materials transferred at interface that are pertinent to the DST Waste Confinement System
Figure 2.0-3  Double-Shell Tank System Architecture Tree*

*Taken from the DST System Architecture Tree (HNF-4208)

**DST I&C System function and subsystems have been relocated in this figure as compared to the DST Systems Architecture Tree (HNF-4208). These changes were made as the result of the development of the DST Monitor & Control System Description document (RPP 5586 Rev 0, Draft) and will be reflected in revisions to HNF-4208.

Legend:
GC = Gas Characterization  VTA = Ventilation Tank Annulus
GM = Gas Monitor  VTP = Ventilation Tank Primary
RM = Radiation Monitor  WST = Waste Storage Tank
SALW = Saltwell Equipment  WSTA = Waste Storage Tank Annulus

25
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3.0 DOUBLE-SHELL TANK CONFINEMENT SYSTEM DESCRIPTION

3.1 OVERVIEW

An analysis was performed to define Confinement System specific functions and architectures as the basis for describing the DST Confinement System. This analysis included reviews of the Functional Analysis for Double-Shell Tank Subsystems (Smith 1999), the Tank Waste Remediation System Architectural Tree (Peck 1999), and all waste storage tank (WST) and Waste Storage Tank Annulus (WSTA) H-14 drawings as summarized in Appendix A. A comprehensive list of structures and components associated with the DSTs was developed via this review, and is discussed in Section 3.3.

3.2 DOUBLE-SHELL TANK CONFINEMENT SYSTEM DEFINITION METHOD

Based on the DST System specification, the DST System functions include Store Waste in West Area DSTs and Store Waste in East Area DSTs. The Functional Analysis for the Double-Shell Tank System (Smith 1999) stated that these store waste functions were actually a series of functions to control tank and waste parameters to include monitor and control, and ventilation.

A waste confinement function is not included in Smith (1999) and, considering that waste storage functions are considered to be a collection of control activities, it can be concluded that waste confinement in the DST System is the passive act of enclosing (isolating/holding) waste stored in the system. It can therefore be concluded that the sole purpose for the DST Confinement System is to passively hold and isolate the waste stored in the DST System, as a platform from which all other active DST functions will be performed.

Based on these functional considerations, the boundaries of the DST Waste Confinement System were established by determining all DST components or architectures associated solely with confining waste within DSTs. The process and criteria for identifying DST Waste Confinement System components are summarized in Figure 3.2-1.
Figure 3.2-1 Double-Shell Tank Waste Confinement System Architecture Identification Process

- **ARCHITECTURE TREE REVIEW (HIIF-4200)**: Identify Waste Storage Tank (WST) and Waste Storage Tank Annulus (WSTA) Designators on DST Storage System Subsystems

- **WST & WSTA H-14 DRAWINGS REVIEW**: Sort DST Components (Equipment) Shown on WST and WSTA H-14 Drawings

- **DST CONFINEMENT SUBSYSTEM DESCRIPTION**: Define DST Confinement System Boundaries Based on DST Components Related Solely to Confining (Isolating/ Holding) Waste within DSTs

---

**SORTING CRITERIA**

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<td>(1) DST Confinement Architecture</td>
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<td>(2) Monitors/Controls DST System</td>
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<td>(3) Cools Waste or Maintains DST Pressure</td>
<td>(3) DST Ventilation System Architecture</td>
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<td>(4) Maintains/Changes Waste Physical/Chemical Properties</td>
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DST = Double-shell tank  
WST = Waste Storage Tank  
WSTA = Waste Storage Tank Annulus
3.3 DOUBLE-SHELL TANK CONFINEMENT SYSTEM DESCRIPTION

Implementing the methodology described in Section 3.2 yielded the findings shown in detail in Appendix A, and summarized in Table 3.3-1. Given these findings, a composite summary sketch of a DST as depicted on the WST and WSTA H-14 drawings could be made (see Figure 3.3-1). Figure 3.3-1 depicts a "typical" DST, showing the Confinement System, as well as other non-confinement system equipment, components, etc., that may be found in or on a DST.

Table 3.3-1 Double-Shell Tank System Components and Associated Systems and Functions

<table>
<thead>
<tr>
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<td><strong>DST Structure</strong></td>
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<td>Primary Tank (Interior Shell)</td>
<td>DST Confinement System Waste Confinement</td>
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<td>Annulus/Leak Detection Pit</td>
<td>DST Confinement System Waste Confinement</td>
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<td>Secondary Tank (Exterior Shell)</td>
<td>DST Confinement System Waste Confinement</td>
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<tr>
<td>Reinforced Concrete (including imbedded Sensors)</td>
<td>DST Confinement System Waste Confinement</td>
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<tr>
<td>Risers / Tank Penetration / Air Lift Circulators</td>
<td>DST Confinement System Waste Confinement (Air Lift Circulators are for Waste Cooling but are structurally part of the DST and not considered part of other subsystems)</td>
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<tr>
<td><strong>Intank Equipment</strong></td>
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<td>Level Elements</td>
<td>M&amp;C Waste Level Monitoring</td>
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<td>Video Camera</td>
<td>M&amp;C Various</td>
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<td>Corrosion/Level Element</td>
<td>M&amp;C Waste Level Monitoring</td>
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<td>Mixer Pump DST Waste Preparation</td>
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<td>Temperature Elements</td>
<td>M&amp;C Thermal Monitoring</td>
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<tr>
<td>Leak Detection Pit and Assoc Equipment</td>
<td>M&amp;C Leak Detection</td>
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<td><strong>Ventilation Instrument Pits</strong></td>
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<td>Continuous Air Monitors</td>
<td>M&amp;C Leak Detection</td>
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<td>DST Ventilation System Monitor DST Gas Discharge</td>
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DST = Double shell tank
M&C = Monitor and control
Figure 3.3-1 Composite Representative Double-Shell Tank

(Typical double-shell tank including attached and inserted equipment)

- Airlift Circulator
- Flow Indicator w/Valve
- Level Element
- Level Indicating Switch
- Motor
- Multiplexor
- Pressure Element

The diagram illustrates a composite double-shell tank with various components such as pressure measuring equipment, ventilation inlet, level detector, and a mixer pump instrumentation & control. The tank is equipped with a primary steel liner and a secondary steel liner, and features a video camera and an annulus leak detector.
Table 3 3-1 can be summarized as follows: the DST Waste Confinement System is defined as all components of the DST structure, including the primary (inner) tank shell, the secondary (exterior) tank shell, the reinforced concrete base and reinforced concrete surrounding the secondary steel shell, all risers including riser extensions and pads provided for pump installations, and penetrations, all ALCs, and the leak detection pit. When the isolation valve occurs immediately at or near the riser, the first isolation valves encountered when moving out from the confinement vessel are included as part of the Confinement System. Isolation valves occurring away from the Confinement System riser are not part of the Confinement System. For example, isolation valves located away from the originating riser, in other enclosures, buildings, etc., are not part of the Confinement System, they belong to the system to which they are attached. The Confinement System does not include annulus pit and annulus pit sensors, etc.

The DST Confinement System also includes all components that are an inseparable and integral to the DST structure. Since the sensors embedded in the DSTs' reinforced concrete components are physically inseparable from the DST structure, they are also included as part of the DST system. A representative DST Confinement System sketch, based on the definition and boundaries presented above, is shown in Figure 3 3-2

As a subsystem within the DST System, the DST Waste Confinement System interfaces with other DST subsystems as shown in the DST Confinement System Interface Diagram (Figure 3 3-3). These interfaces include the passing of material between the Confinement System and the Transfer Valving System, Transfer Pump System, DST Service Air System, and DST Maintenance and Recovery System, as well as the physical support of other systems including the DST Monitor and Control System and the Mixer Pump System.
Figure 3 3-2  Double-Shell Tank Confinement System

Legend

ALC = Airlift Circulator
TE = Temperature Sensor Element
I = Isolation Valve
\( \circ \) = Riser
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40 CONCLUSIONS

The DST Confinement System consists solely of the structures and components that make up the basic DST structure, and excludes all attachments and insertions. The Confinement System performs a passive activity by containing waste. Other systems are attached to or inserted into the DST Confinement System to accomplish the Waste Feed Delivery mission. The DST Confinement Systems, as already existing structures, will not require modification, etc., to accomplish their waste confinement task. A formal specification for the DST Confinement System is, therefore, not necessary.

The DST Confinement System is defined as follows:

The DST Confinement System includes the primary (inner) steel shell, secondary (exterior) steel shell, intermediate annulus area between the shells, reinforced concrete base and concrete surrounding the secondary steel shell, all tank penetrations and risers including riser extensions, pads provided for pump installations and isolation valves attached to or located immediately adjacent to risers, air lift circulators, leak detection pits, excluding leak detection sensors and equipment, and other components that are an integral part of the DST structure including sensors embedded in concrete.

While the task of confining DST wastes and architectures for accomplishing this task exists, there are no corresponding functions included in the functional breakdown of the Store Waste function. It is suggested that the Functional Analysis for Double-Shell Tank Subsystems (Smith 1999) be revised to include functions for confining waste in the DST system, as subfunctions under Store Waste.
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50 REFERENCES


APPENDIX A

H-14 DRAWING REVIEW FINDINGS OF ARCHITECTURES PHYSICALLY ASSOCIATED WITH DOUBLE-SHELL TANK STRUCTURES
## Drawings Reviewed

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### AN Tank Farm Components

**Identified from Waste Storage Tank and Waste Storage Tank Annulus H 14 drawings**

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<thead>
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<td>Secondary Tank (Exterior Shell)</td>
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<td>Reinforced Concrete (Including Imbedded Sensors)</td>
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<td>DST Confinement System Waste Confinement</td>
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<td>Riser / Tank Penetration (Including Isolation Valves)</td>
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<tr>
<td>Air Lift Circulators</td>
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<td>Waste Cooling</td>
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**Intank Equipment**

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<th>M&amp;C Waste Level Monitoring</th>
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<td>M&amp;C Temperature Control</td>
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<td>WST</td>
<td>M&amp;C</td>
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<td>Pressure Elements</td>
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<td>M&amp;C</td>
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<td>Video Camera</td>
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<td>M&amp;C Various</td>
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<td>Corrosion/Level Element</td>
<td>107</td>
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<td>M&amp;C Waste level</td>
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<td>Pumps (Mixer, Motor, etc)</td>
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<td>Waste Preparation</td>
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**Annulus Related Equipment**

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<th>M&amp;C Thermal Monitoring</th>
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<td>Leak Detection Pts &amp; Assoc Eq</td>
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<td>M&amp;C Leak Detection</td>
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<tr>
<td>Continuous Air Monitors</td>
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<td>WSTA</td>
<td>M&amp;C Leak Detection</td>
</tr>
<tr>
<td>Flow Control Valves</td>
<td>All</td>
<td>WSTA</td>
<td>DST Ventilation System</td>
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<tr>
<td>Fans</td>
<td>All</td>
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<td>DST Ventilation System</td>
</tr>
<tr>
<td>Temperature Switches</td>
<td>2 per Pts</td>
<td>WSTA</td>
<td>DST Ventilation System</td>
</tr>
<tr>
<td>Misc Pumps, Heats, Filters, etc</td>
<td>All</td>
<td>WSTA</td>
<td>DST Ventilation System</td>
</tr>
</tbody>
</table>

*Listing includes all DST components etc directly on or inside of DSTs but excludes control rooms etc not physically located with the tank.

DST = Double shell tank
M&C = Monitor and Control
WSTA = Waste Storage Tank Annulus
### AP Tank Farm Components

(Identified from Waste Storage Tank and Waste Storage Tank Annulus H 14 drawings)

<table>
<thead>
<tr>
<th>DST Component</th>
<th>AP Tank</th>
<th>System</th>
<th>System Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DST Structure</strong></td>
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<tr>
<td>Primary Tank (Interior Shell)</td>
<td>All</td>
<td>WST</td>
<td>DST Confinement System Waste Confinement</td>
</tr>
<tr>
<td>Annulus/Leak Detection Pit</td>
<td>All</td>
<td>WSTA</td>
<td>DST Confinement System Waste Confinement</td>
</tr>
<tr>
<td>Secondary Tank (Exterior Shell)</td>
<td>All</td>
<td>WSTA</td>
<td>DST Confinement System Waste Confinement</td>
</tr>
<tr>
<td>Reinforced Concrete (Including Imbedded Sensors)</td>
<td>All</td>
<td>WST</td>
<td>DST Confinement System Waste Confinement</td>
</tr>
<tr>
<td>Risers / Tank Penetration (Including Isolation Valves)</td>
<td>All</td>
<td>WST &amp; WSTA</td>
<td>DST Confinement System Waste Confinement</td>
</tr>
<tr>
<td>Air Lift Circulators</td>
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**Intank Equipment**

<table>
<thead>
<tr>
<th>Level Elements</th>
<th>All</th>
<th>WST</th>
<th>M&amp;C Waste Level Monitoring</th>
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</thead>
<tbody>
<tr>
<td>Temperature Elements</td>
<td>All</td>
<td>WST</td>
<td>M&amp;C Temperature Control</td>
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<tr>
<td>Moisture Elements</td>
<td>102</td>
<td>WST</td>
<td>M&amp;C</td>
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<tr>
<td>Pressure Elements</td>
<td>102</td>
<td>WST</td>
<td>M&amp;C</td>
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<tr>
<td>Vibration Sensor</td>
<td>102</td>
<td>WST</td>
<td>M&amp;C</td>
</tr>
<tr>
<td>Video Camera</td>
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<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Corrosion/Level Element</td>
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</tr>
<tr>
<td>Pumps (Mixer, Motors, etc)</td>
<td>102</td>
<td>WST</td>
<td>Waste Preparation</td>
</tr>
</tbody>
</table>

**Annulus Related Equipment**

| Temperature Elements | All | WSTA | M&C Thermal Monitoring |
| Level Elements | All | WSTA | M&C Waste Level Monitoring |
| Leak Detection Pit & Assoc. Eq | All | WSTA | M&C Leak Detection |
| Continuous Air Monitors | All | WSTA | M&C Leak Detection |
| Flow Control Valves | All | WSTA | DST Ventilation System |
| Fans | All | WSTA | DST Ventilation System |
| Temperature Switches | 2 per Pit | WSTA | DST Ventilation System |
| Misc. Pumps, Heaters, Filters, etc | All | WSTA | DST Ventilation System |

Listing includes all DST components etc. directly on or inside of DSTs but excludes control rooms etc. not physically located with the tank.
## AW Tank Farm Components

(Identified from Waste Storage Tank and Waste Storage Tank Annulus H 14 drawings)

<table>
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<tr>
<th>DST Component</th>
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<tr>
<td>Secondary Tank (Exterior Shell)</td>
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<tr>
<td>Reinforced Concrete (including Imbedded Sensors)</td>
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<td>DST Confinement System Waste Confinement</td>
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<tr>
<td>Risers / Tank Penetration (including Isolation Valves)</td>
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<td>WST &amp; WSTA</td>
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<tr>
<td>Air Lift Circulators</td>
<td>102</td>
<td>WST</td>
<td>Waste Cooling</td>
</tr>
</tbody>
</table>

## Intank Equipment

| Level Elements | All | WST | M&C Waste Level Monitoring |
| Temperature Elements | All | WST | M&C Temperature Control |
| Moisture Elements | none | N/A | |
| Pressure Elements | none | N/A | |
| Vibration Sensor | none | N/A | |
| Video Camera | 101 | WST | M&C Various |
| Corrosion/Level Element | none | N/A | |
| Pumps (Mixer, Motors, etc) | none | N/A | |

## Annulus Related Equipment

| Temperature Elements | All | WSTA | M&C Thermal Monitoring |
| Level Elements | All | WSTA | M&C Waste Level Monitoring |
| Leak Detection Pit & Assoc. Eq | All | WSTA | M&C Leak Detection |
| Continuous Air Monitors | All | WSTA | M&C Leak Detection |
| Flow Control Valves | All | WSTA | DST Ventilation System |
| Fans | All | WSTA | DST Ventilation System |
| Temperature Switches | All | WSTA | DST Ventilation System |
| Misc. Pumps, Heaters, Filters, etc | All | WSTA | DST Ventilation System |
| Radiation Monitor | All | WSTA | M&C Leak Detection |

**Listing includes all DST components etc. directly on or inside of DSTs but excludes control rooms etc. not physically located with the tank.**
## AY Tank Farm Components

(Identified from Waste Storage Tank and Waste Storage Tank Annulus H 14 drawings)

<table>
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<tr>
<th>DST Component</th>
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<td>WST &amp; WSTA</td>
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### Intank Equipment

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<td>M&amp;C Waste Level Monitoring</td>
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### Annulus Related Equipment

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<td>M&amp;C Leak Detection</td>
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</table>

Listing includes all DST components etc. directly on or inside of DSTs but excludes control rooms etc. not physically located with the tank.
# AZ Tank Farm Components

(Identified from Waste Storage Tank and Waste Storage Tank Annulus H 14 drawings)

<table>
<thead>
<tr>
<th>DST Component</th>
<th>Tank</th>
<th>System</th>
<th>System Function</th>
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<tbody>
<tr>
<td><strong>DST Structure</strong></td>
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<td>Primary Tank (Interior Shell)</td>
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</tr>
<tr>
<td>Annulus/Leak Detection Pit</td>
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<td>DST Confinement System Waste Confinement</td>
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<td>DST Confinement System Waste Confinement</td>
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<td>(Including Imbedded Sensors)</td>
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<td>Risers / Tank Penetration (Including Isolation Valves)</td>
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<td>WSTA &amp; WST</td>
<td>DST Confinement System Waste Confinement</td>
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<td>Air Lift Circulators</td>
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<td><strong>Intank Equipment</strong></td>
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<td>Video Camera</td>
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<tr>
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<tr>
<td>Pumps (Mixer, Motors, etc.)</td>
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<td>Waste Preparation</td>
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<td>M&amp;C</td>
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<td>Level Elements</td>
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<td>Leak Detection Pit &amp; Assoc. Eq</td>
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<td>M&amp;C Leak Detection</td>
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<td>Continuous Air Monitors</td>
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<td>M&amp;C Leak Detection</td>
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<td>DST Ventilation System</td>
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<td>Radiation Sensing Elements</td>
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<td>M&amp;C</td>
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<td>All</td>
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<td>DST Ventilation System</td>
</tr>
<tr>
<td>Temperature Switches</td>
<td>2 per Pit</td>
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<td>DST Ventilation System</td>
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<td>Mac. Pumps, Heaters, Filters, etc</td>
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<td>WSTA</td>
<td>DST Ventilation System</td>
</tr>
</tbody>
</table>

Listing includes all DST components etc. directly on or inside of DSTs but excludes control rooms etc. not physically located with the tank.
<table>
<thead>
<tr>
<th>DST Component</th>
<th>Tank</th>
<th>System</th>
<th>System Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>DST Structure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Tank (Interior Shell)</td>
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<td>DST Confinement System Waste Confinement</td>
</tr>
<tr>
<td>Annulus/Leak Detection Pit</td>
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<td>Secondary Tank (Exterior Shell)</td>
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<tr>
<td>Reinforced Concrete (Including Imbedded Sensors)</td>
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<tr>
<td>Risers / Tank Penetration (Including Isolation Valves)</td>
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<td>DST Confinement System Waste Confinement</td>
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<tr>
<td>Air Lift Circulators</td>
<td>102</td>
<td>WST</td>
<td>Waste Cooling</td>
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<td>Intank Equipment</td>
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<tr>
<td>Level Elements</td>
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<td>M&amp;C Level</td>
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<tr>
<td>Temperature Elements</td>
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<td>WST</td>
<td>M&amp;C Temperature Control</td>
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<tr>
<td>Moisture Elements</td>
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<td>M&amp;C</td>
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<tr>
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<tr>
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<tr>
<td>Speed/Velocity Element</td>
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<tr>
<td>Strain Gauge</td>
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<td>M&amp;C</td>
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<td>M&amp;C</td>
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<tr>
<td>Video Camera</td>
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<td>M&amp;C Various</td>
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<td>Radar Gauge</td>
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<tr>
<td>Corrosion/Level Element</td>
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<td>Pumps (Mixer, Motor+A24s, etc.)</td>
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<td>WST</td>
<td>Waste Preparation</td>
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<td>Annulus Related Equipment</td>
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<tr>
<td>Temperature Elements</td>
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<td>M&amp;C Thermal Monitoring</td>
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<td>Leak Detection Pk &amp; Assoc. Eq</td>
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<td>Continuous Air Monitors</td>
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<td>Temperature Switches</td>
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<td>DST Ventilation System</td>
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<td>Misc Pumps, Heaters, Filters, etc</td>
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<td>DST Ventilation System</td>
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</table>

Listing includes all DST components etc directly on or inside of DSTs but excludes control rooms etc not physically located with the tank.
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