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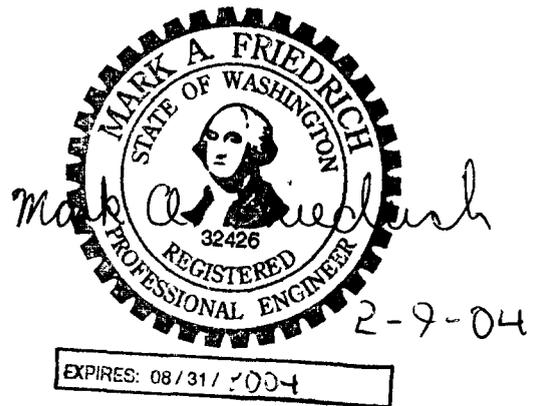
Document title: **System Logic Description for High Level Waste Facility - Canister Decontamination Handling (HDH) System**

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History Sheet

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Acronyms

Reference the piping and instrumentation diagrams (P&IDs) symbols and legend sheets as listed in the Applicable Documents section, for acronyms and abbreviations used in the figures.

AEA	<i>Atomic Energy Act of 1954</i>
AI	analog input
DI	density indicator where in circle in square, discrete input where in triangle
DT	density transmitter
DOE	US Department of Energy
HDH	canister decontamination handling system
HLW	high-level waste
LAH	level alarm high
LAHH	level alarm high-high
LI	level indicator
LSH	level switch high
LSHH	level switch high-high
LSL	level switch low
LT	level transmitter
P&ID	piping and instrumentation diagram
WTP	Hanford Tank Waste Treatment and Immobilization Plant
PMP	pump
PWD	plant wash and disposal system
VSL	vessel

Glossary

control system	This term refers to electronic processors that perform regulatory and logic control functions necessary for normal operation of the plant.
local operator interface	This term refers to the interfaces at the cave faces where the operator will control the system.
interlock	Predetermined system equipment connection so that action of one part of the system affects the actions of another part of the system.
low-level control point	This term refers to a notification in the control system that is activated when the low level set point of the vessel has been reached.
high-level control point	This term refers to a notification in the control system that is activated when the high level set point of the vessel has been reached.
high-high level control point	This term refers to a notification in the control system that is activated when the high-high level set point of the vessel has been reached.
level signal	This term refers to information from an instrument measuring the height of fluid in a vessel.

1 Introduction

This document describes the instrument control logic for dangerous waste tanks and ancillary equipment for the canister decontamination handling (HDH) system within the high-level waste (HLW) facility as it pertains to the dangerous waste permit.

2 Applicable Documents

24590-HLW-3YD-HDH-00001, *Process System Description of HLW Canister Decontamination Handling System (HDH)*.

24590-HLW-M6-HDH-P0001, *P&ID-HLW Canister Decontamination Handling System*.

24590-HLW-M6-HDH-P0002, *P&ID-HLW Canister Decontamination Handling System*.

24590-HLW-M6-HDH-P20001, *P&ID-HLW Canister Decontamination Handling System*.

24590-WTP-M6-50-P0001, *P&ID Symbols and Legend Sheet 1 of 6*.

24590-WTP-M6-50-P0002, *P&ID Symbols and Legend Sheet 2 of 6*.

24590-WTP-M6-50-P0003, *P&ID Symbols and Legend Sheet 3 of 6*.

24590-WTP-M6-50-P0004, *P&ID Symbols and Legend Sheet 4 of 6*.

24590-WTP-M6-50-P0005, *P&ID Symbols and Legend Sheet 5 of 6*.

24590-WTP-M6-50-P0006, *P&ID Symbols and Legend Sheet 6 of 6*.

3 Description

The tank and ancillary equipment associated with dangerous waste management within the HLW HDH process system are the following:

- HDH-VSL-00001 rinse tunnel canister rinse vessel
- HDH-VSL-00002 canister decontamination vessel 1
- HDH-VSL-00003 waste neutralization vessel
- HDH-VSL-00004 canister decontamination vessel 2
- HDH-PMP-00001 bogie decontamination canister pump

3.1 Rinse Tunnel Canister Rinse Vessel (HDH-VSL-00001) and Bogie Decontamination Canister Pump (HDH-PMP-00001)

The HDH system function is to decontaminate HLW canisters. The canisters are transferred from the HLW canister handling cave to the rinse tunnel canister rinse vessel (HDH-VSL-00001) after the lids are welded. The rinse tunnel canister rinse vessel (HDH-VSL-00001) is where the decontamination sequence starts. To prevent overflow, the rinse tunnel canister rinse vessel (HDH-VSL-00001) is equipped with a level transmitter.

When the operator is notified that the rinse tunnel canister rinse vessel (HDH-VSL-00001) is ready to rinse the canister, the operator will initiate the "rinse" sequence within the control system. When initiated, the control system verifies that all instruments, utilities, and equipment associated with the "rinse" cycle are within operational parameters. After all instrumentation is verified, demineralized water is sprayed on the canister and the control system starts the bogie decontamination canister pump (HDH-PMP-00001). The rinse is stopped by the control system when the level in the rinse tunnel canister rinse vessel (HDH-VSL-00001) reaches its high-high level control point, a specified volume has been sprayed on the canister, or the waste neutralization vessel (HDH-VSL-00003) reaches its high-level control point. After the "rinse" cycle is complete and the rinse tunnel canister rinse vessel (HDH-VSL-00001) low-level control point has been reached, the control system will notify the operator through the local operator interface that the rinsed canister can be transferred to one of the canister decontamination vessels (HDH-VSL-00002 or HDH-VSL-00004).

If the tank level is outside the normal operating range due to an abnormality, interlocks along with alarms within the control system prevent an overflow condition. Figure 1 shows the interlocks and alarms for the level instrument associated with the rinse tunnel canister rinse vessel (HDH-VSL-00001). Figure 1 also shows the level control logic for the bogie decontamination canister pump (HDH-PMP-00001). To prevent overflows and loss of primary containment, the control system alarms at high level values. The level signal can activate an interlock or alarm within the control system. Upon receiving the high alarm level signal, the control system indicates a high alarm to the operator and starts the bogie decon canister pump (HDH-PMP-00001). On a high-high alarm, the control system automatically stops all transfers into the rinse tunnel canister rinse vessel (HDH-VSL-00001) and alerts the operator.

3.2 Canister Decontamination Vessel 1 (HDH-VSL-00002) and Vessel 2 (HDH-VSL-00004)

When the water rinse cycle is complete in the rinse tunnel canister rinse vessel (HDH-VSL-00001), the canister is transferred to one of the canister decontamination vessels (HDH-VSL-00002 or HDH-VSL-00004) to be decontaminated with a cerium nitrate bath. Either of the canister decontamination vessels (HDH-VSL-00002 or HDH-VSL-00004) can perform the decontamination process. The canister decontamination vessels (HDH-VSL-00002 or HDH-VSL-00004) receive incoming transfers from the cerium⁴⁺ addition tank (HDH-TK-00002), and the nitric acid dilution and distribution tank (NAR-TK-00001). Transfers between these tanks and vessels will be measured and verified by the HLW control system. The canister decontamination vessels (HDH-VSL-00002 or HDH-VSL-00004) are limited by the control system to one transfer at a time, whether it be in or out of the vessel. The density of the liquid in the canister decontamination vessel (HDH-VSL-00002 or HDH-VSL-00004) is measured and used to accurately determine the level of liquid in the vessel.

The vessel is empty when it receives the canister. The operator will initiate the transfer-in sequence when the vessel has received the canister and is able to receive decontamination fluids. The controls for

transferring both nitric acid and cerium nitrate are the same, but they are initiated at different times. When the transfer-in sequence is initiated, the control system will verify that all instruments, utilities, and equipment associated with the transfer are within operational parameters. Specific volumes of nitric acid from the nitric acid dilution and distribution tank (NAR-TK-00001) and cerium⁴⁺ from the cerium 4+ addition tank (HDH-TK-00002) will be added to the canister decontamination vessel (HDH-VSL-00002 or HDH-VSL-00004). The transfer will be stopped by the control system when either the level in the canister decontamination vessel (HDH-VSL-00002 or HDH-VSL-00004) reaches its high control point or the level in the nitric acid dilution and distribution tank (NAR-TK-00001) reaches its low-level control point. When the transfer is stopped and the specified time for the canister to remain in the chemical bath has been reached, the control system will notify the operator through the local operator interface that the contents of the canister decontamination vessel (HDH-VSL-00002 or HDH-VSL-00004) are ready to be transferred.

The operator will initiate the transfer-out sequence within the control system. Upon sequence initiation, the control system verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. The transfer is stopped by the control system when the level in the canister decontamination vessel (HDH-VSL-00002 or HDH-VSL-00004) reaches its low-level control point, a specified volume has been transferred, or the waste neutralization vessel (HDH-VSL-00003) reaches its high-level control point. When the low-level control point has been reached and the transfer is stopped, the control system will notify the operator through the plant control system interface that the canister decontamination vessel (HDH-VSL-00002 or HDH-VSL-00004) is empty and ready for the next step in the decontamination process.

If the vessel levels are outside the normal operating range due to an abnormality, interlocks along with alarms within the control system prevent an overflow condition. Figure 2 shows the interlocks and alarms for the level instrument associated with the canister decontamination vessels (HDH-VSL-00002 or HDH-VSL-00004). Table 1 shows the level instruments associated with the canister decontamination vessels (HDH-VSL-00002 or HDH-VSL-00004). To prevent overflows and loss of primary containment, the control system alarms at two different high values. Upon reaching the high alarm level, the control system indicates a high alarm to the operator and stops incoming transfers. On a high-high alarm, the control system automatically stops all transfers within the HDH system and alerts the operator.

3.3 Waste Neutralization Vessel (HDH-VSL-00003)

The waste neutralization vessel (HDH-VSL-00003) functions as the effluent collection and neutralization vessel for the HLW HDH System. The waste neutralization vessel (HDH-VSL-00003) is capable of receiving all the contents of all the vessels within the HDH system. The transfer is stopped by the control system when the level in the waste neutralization vessel (HDH-VSL-00003) reaches its high-level control point or a specified volume has been transferred. Once the transfer is stopped, the control system will notify the operator through the local operator interface that contents of the waste neutralization vessel (HDH-VSL-00003) are ready to be neutralized and transferred.

The operator will initiate the transfer-out sequence within the control system. When initiated, the control system verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. The transfer is stopped by the control system either when the level in the waste neutralization vessel (HDH-VSL-00003) reaches its low-level control point, a specified volume has been transferred, or the acidic waste vessel (RLD-VSL-00007) reaches its high-level control point. Once the low-level control point has been reached and the transfer is stopped, the control system will notify the

operator through the plant control system interface that the waste neutralization vessel (HDH-VSL-00003) is ready to receive effluent.

If the level is outside the normal operating range due to an abnormality, interlocks along with alarms within the control system prevent an overflow condition. Figure 3 shows the interlocks and alarms for the level instrument associated with the waste neutralization vessel (HDH-VSL-00003). To prevent overflows and loss of primary containment, the control system alarms at two different high values. Upon reaching the high alarm level, the control system indicates a high alarm to the operator and stops incoming transfers. On a high-high alarm, the control system automatically stops all transfers within the HDH system and alerts the operator.

Table 1 Associated Instruments for HLW canister decontamination vessel 1 (HDH-VSL-00002) and HLW canister decontamination vessel 2 (HDH-VSL-00004)

Instrument Tag Number	Associated Vessel	Description
HDH-LT-0118	HDH-VSL-00002	level control
HDH-DT-0117	HDH-VSL-00002	density
HDH-LT-0218	HDH-VSL-00004	level control
HDH-DT-0217	HDH-VSL-00004	density

Figure 1 Level Control for Rinse Tunnel Canister Rinse Vessel (HDH-VSL-00001) and Bogie Decontamination Canister Pump (HDH-PMP-00001)

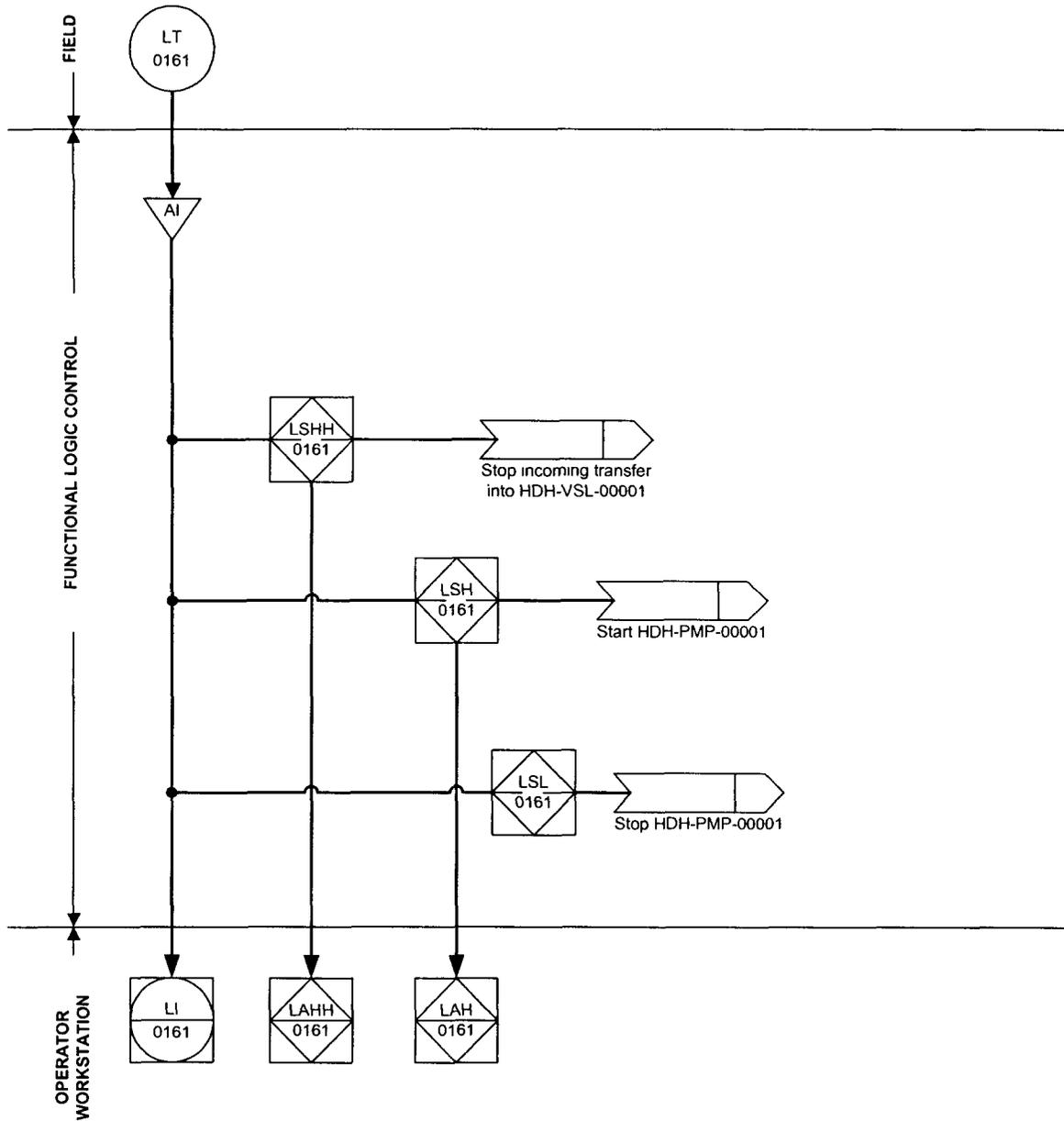


Figure 2 Level Control for Canister Decontamination Vessel 1 (HDH-VSL-00002) and Canister Decontamination Vessel 2 (HDH-VSL-00004)

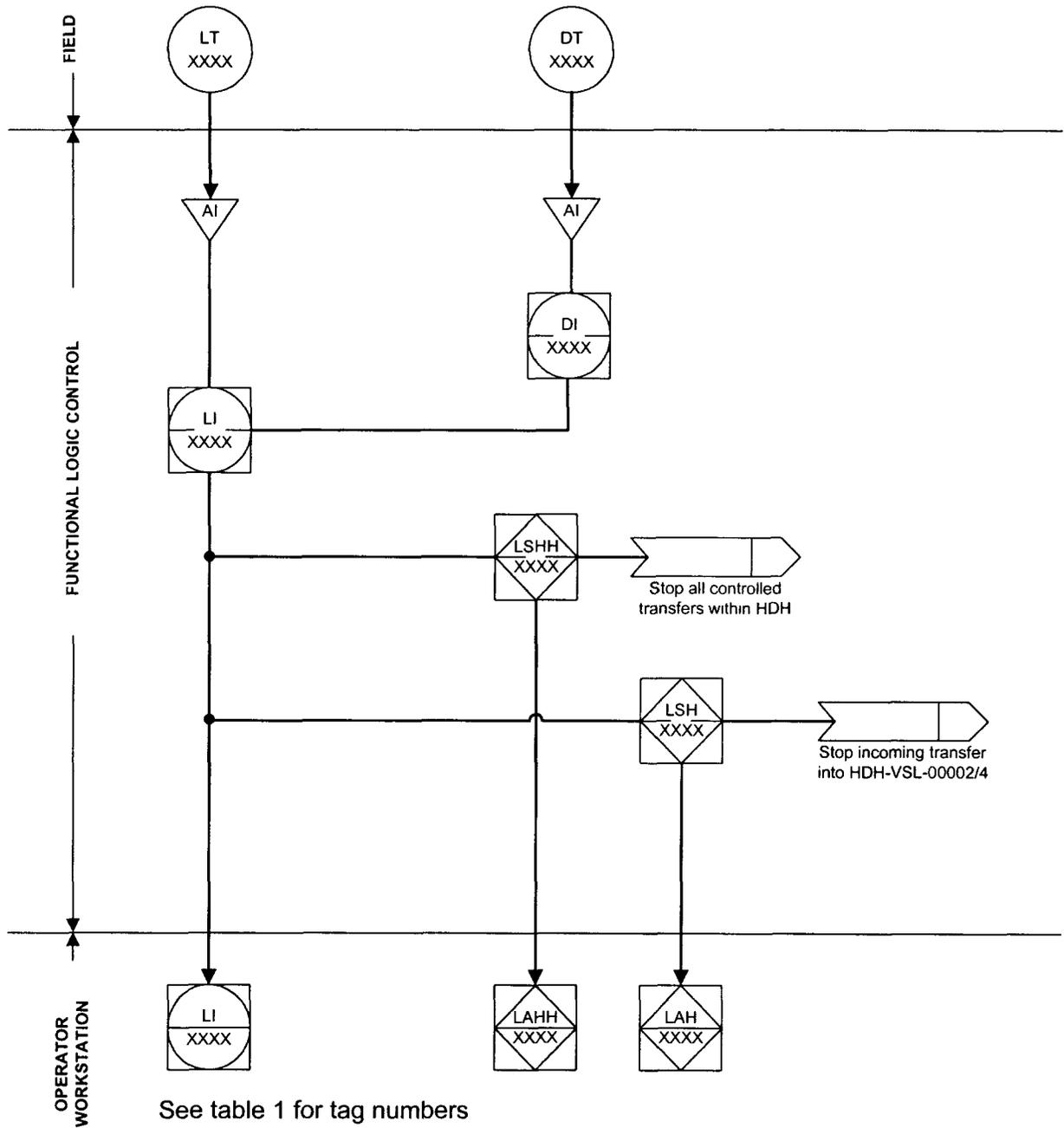


Figure 3 Level Control for Waste Neutralization Vessel (HDH-VSL-00003)

