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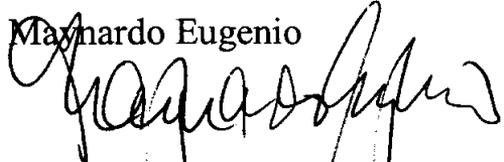
  
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Pretreatment Facility Pulse Jet  
Ventilation System**

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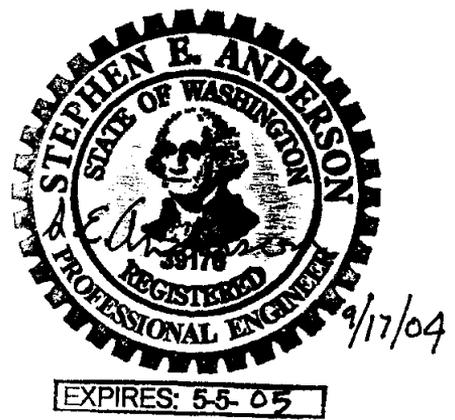
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## Notice

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## History Sheet

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## Acronyms and Abbreviations

DOE	US Department of Energy
HLW	High Level Waste
LAH	Level Alarm High
LAHH	Level Alarm High-High
LAL	Level Alarm Low
LALL	Level Alarm Low-Low
LI	Level Indication
LOL	lower operating limit
LSH	Level Switch High
LSHH	Level Switch High-High
LSL	Level Switch Low
LSLL	Level Switch Low-Low
LT	Level Transmitter
P&ID	pipng and instrumentation diagram
PCS	process control system
PJV	Pulse Jet Ventilation System
PT	pretreatment
PWD	Plant Wash and Disposal System
RLD	Radioactive Liquid Disposal System
TFC	tank farm contractor
UOL	upper operating limit
WTP	River Protection Project - Waste Treatment Plant

## Glossary

acquire	Acquire is a command under a batch control that reserves a group of equipment for that particular batch control operation.
actual volume	Actual volume is the amount, in US gallons, of waste or process fluid in any vessel.
available space	Available space refers to the volume, in US gallons, of waste or process fluid that any vessel can accommodate and remain below the upper operating limit (UOL). Available space can be calculated as follows: <i>Available Space = UOL – Actual Volume</i>
available volume	Available volume refers to the volume, in US gallons, of waste or process fluid that any vessel can transfer to another vessel and remain above the lower operating limit (LOL). Available volume can be calculated as follows: <i>Available Volume = Actual Volume – LOL</i>
batch	This refers to material that is being produced or that has been produced by a single execution of a batch process.
batch control	This term refers to control activities and control functions that provide an ordered set of processing activities to complete a batch process.
batch process	A batch process leads to the production of a finite quantity of material by subjecting quantities of input material to an ordered set of processing activities over a finite period of time using one or more pieces of equipment.
control system	This term refers to electronic processors that perform regulatory and logic control functions necessary for normal operation of the plant.
exception handling	This term refers to those functions that deal with plant or process contingencies and other events that occur outside the normal or desired behavior of batch control.
intermediate products	These are treated high-level waste (HLW) products that are staged and blended in the pretreatment (PT) facility prior to immobilization in the HLW vitrification facility. These products include treated solids slurry, strontium and transuranic elements (Sr/TRU) precipitate slurry and cesium concentrate.
LOL	Lower operating limit- a vessel low level set point used to stop a transfer-out batch operation from that vessel under normal plant operations.
permissive	A permissive is an interlock that allows a device to change state or a sequence to start. Once a device has changed state or a sequence has started, a permissive has no further effect on the device or sequence.
release	Release is a command under a batch control that opens up a group of equipment for any batch control to acquire.
requested volume	The requested volume is the volume, in US gallons, of waste or process fluid that can be delivered to the destination vessel and the total volume will remain below the vessel's upper operating level.

Sr/TRU precipitate	For envelope C feed, the strontium and transuranic elements are precipitated out of solution and separated from the supernate along with any entrained solids to produce the slurry.
trip	A trip is an interlock that does not allow a device to change state or a sequence to start. Once a device has changed state or a sequence has started, a trip continues to have an effect on the device or sequence.
UOL	Upper operating limit – A vessel high level setpoint used to stop a transfer-in batch operation to that vessel under normal plant operation.

# 1 Introduction

This document describes the control logic associated with vessel instrumentation and other ancillary equipment within the pulse jet ventilation system in the pretreatment (PT) facility that function to prevent inadvertent overflows within this system through the control system.

## 2 Applicable Documents

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.*

24590-PTF-M6-PJV-P0002, *P&ID-PTF Pulse Jet Ventilation System Inlet Header to Demister Outlet*

24590-PTF-3YD-PJV-00001, *System Description for PTF Pulse Jet Ventilation System, (PJV)*

## 3 Description

The following plant items and associated ancillary equipment are associated with dangerous waste management within the PJV system as a part of the PT facility.

Pulse Jet Ventilation Demisters (PJV-DMST-00002A/B/C)

Pulse Jet Ventilation Drain Collection Vessel (PJV-VSL-00002)

Pulse Jet Ventilation Drain Pump Bulge (PJV-BULGE-00001)

Pulse Jet Ventilation Primary HEPA Filters (PJV-HEPA-00001A/B/C/D/E/F/G)

Pulse Jet Ventilation Secondary HEPA Filters (PJV-HEPA-00002A/B/C/D/E/F)

Pulse Jet Ventilation Drain Transfer Pumps (PJV-PMP-00001A/B)

PJV Exhaust Fans (PJV-FAN-00001A/B/C)

### 3.1 Pulse Jet Ventilation Demisters PJV-DMST-00002A, PJV-DMST-00002B, PJV-DMST-00002C

RFD and PJM exhaust gas stream from various pretreatment vessels will flow via several sub-headers to a main header to the demisters for removal of sub-micron fine aerosols and mist to adequately protect the downstream HEPA filters from excessive activity build up. There will be three 50% capacity demisters, of which two are in service and one is available as standby. Demisters are passive devices and can be put in

service or isolated from the process by opening or closing the isolation valve provided at the inlet of each demister.

Demisters will be washed periodically with demineralized water. Process Condensate from the sub headers and the washings from demisters will flow into the demister drain collection vessel (PJV-VSL-00002). During normal operation, the level in the demisters is continuously monitored by the control system. If the level reaches a predetermined high set point due to abnormality such as a clog in the drain line, interlocks and alarms within the control system stop the demineralized water supply to the demisters. Alternatively, demineralized water supply can be stopped manually at the discretion of the operator.

Refer to Figure 1, 2 and 3 for level measurement details for the demisters.

### **3.2 Pulse Jet Ventilation Drain Collection Vessel, PJV-VSL-00002**

When the demisters are operating, the demister drain collection vessel (PJV-VSL-00002) will continuously receive and store any liquid collected from the demisters. It will also receive any liquid collected from the low points in the PJV header or any flush solution (primarily process condensate from system RLD) from the header should the header require flushing. This vessel can also receive process condensate directly from system RLD to ensure a minimum level is maintained. When the level reaches a predetermined setpoint, a portion of the solution is transferred to the plant wash vessel (PWD-VSL-00044) in the plant wash and disposal system (PWD). While stored, the liquid solution is continuously recycled to provide adequate mixing and avoid settling of solids.

Under normal conditions, the level in the drain collection vessel (PJV-VSL-00002) is continuously monitored and maintained by the control system within the normal operating range by transferring excess of the liquid solution to the plant wash vessel (PWD-VSL-00044) in the plant wash and disposal system (PWD).

The drain collection vessel (PJV-VSL-00002) transfers are controlled by the control system and limited by the batch control mechanism of acquiring and releasing of the plant wash vessel in system PWD. The acquire and release commands ensure that the entities involved in this batch transfer cannot transfer in or out from multiple destinations at the same time. Once the drain collection vessel (PJV-VSL-00002) is ready to transfer, the operator will initiate a transfer-out sequence within the control system. Once initiated, the control system verifies that instruments, utilities, and equipment associated with the transfer are within operational parameters and remain as such throughout the transfer. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic. Under normal operating conditions the sequence will end if any of the following becomes true:

- The level in the plant wash vessel (PWD-VSL-00044) reaches its upper operating limit (UOL).
- The specified volume is transferred.
- The level in the drain collection vessel (PJV-VSL-00002) reaches its lower operating limit (LOL).

When the level in the drain collection vessel (PJV-VSL-00002) is no longer within the normal operating range due to abnormality, low level interlocks along with alarms within the control system will stop the moving force. Overflow conditions will be prevented administratively by the operator upon receiving a High level alarm. If the level continues to increase beyond the high level setpoint, The control system will automatically stop all incoming feeds into vessel (PJV-VSL-00002) via a high high interlock.

Refer to Figure 4 for level measurement details for the drain collection vessel (PJV-VSL-00002).

### **3.3 Pulse Jet Ventilation Drain Pump Bulge (PJV-BULGE-00001)**

The PJV bulge (PJV-BULGE-00001) is maintained dry. Upon detection of a high liquid level in the bulge, the control system alarms and the operator must take the necessary action to empty the bulge. Figure 5 shows the high alarm for the level instrument associated with the PJV bulge (PJV-BULGE-00001).

### **3.4 Other Miscellaneous Treatment Units**

(Pending design evolution of the Pretreatment Pulse Jet Ventilation (PJV) Systems).

Figure 1 Level Measurement for Pulse Jet Ventilation Demister (PJV-DMST-00002A)

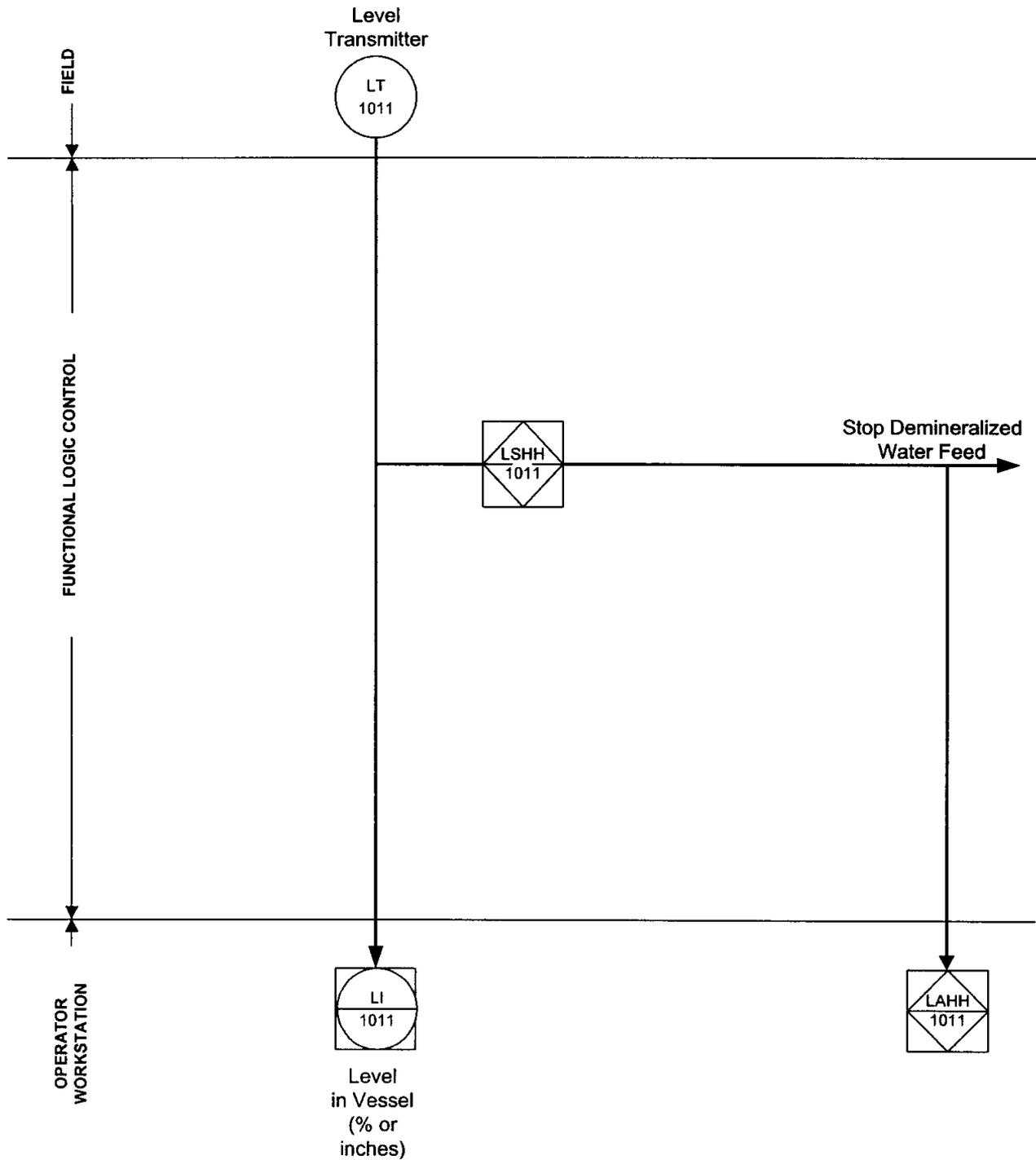


Figure 2 Level Measurement for Pulse Jet Ventilation Demister (PJV-DMST-00002B)

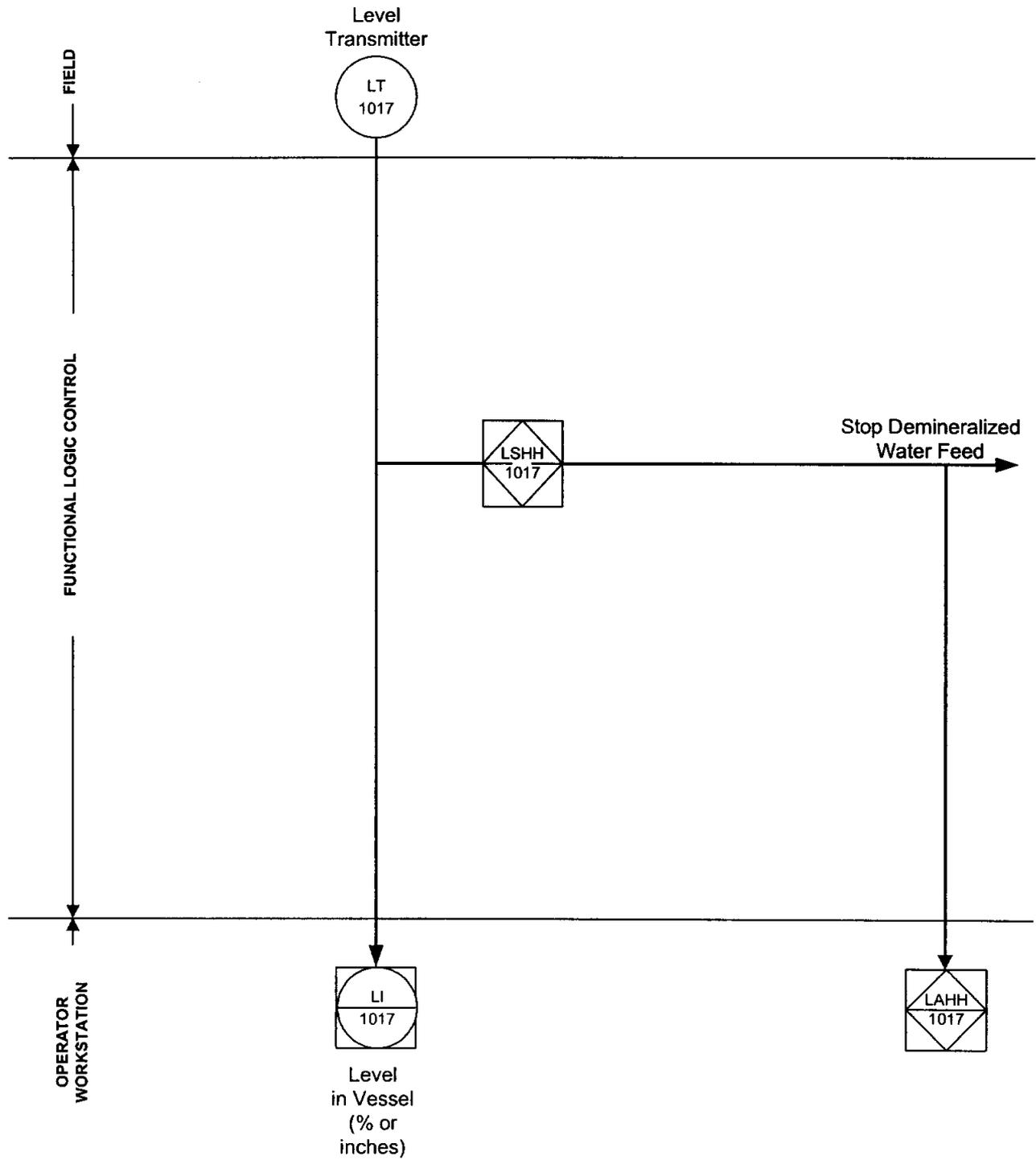


Figure 3 Level Measurement for Pulse Jet Ventilation Demister (PJV-DMST-00002C)

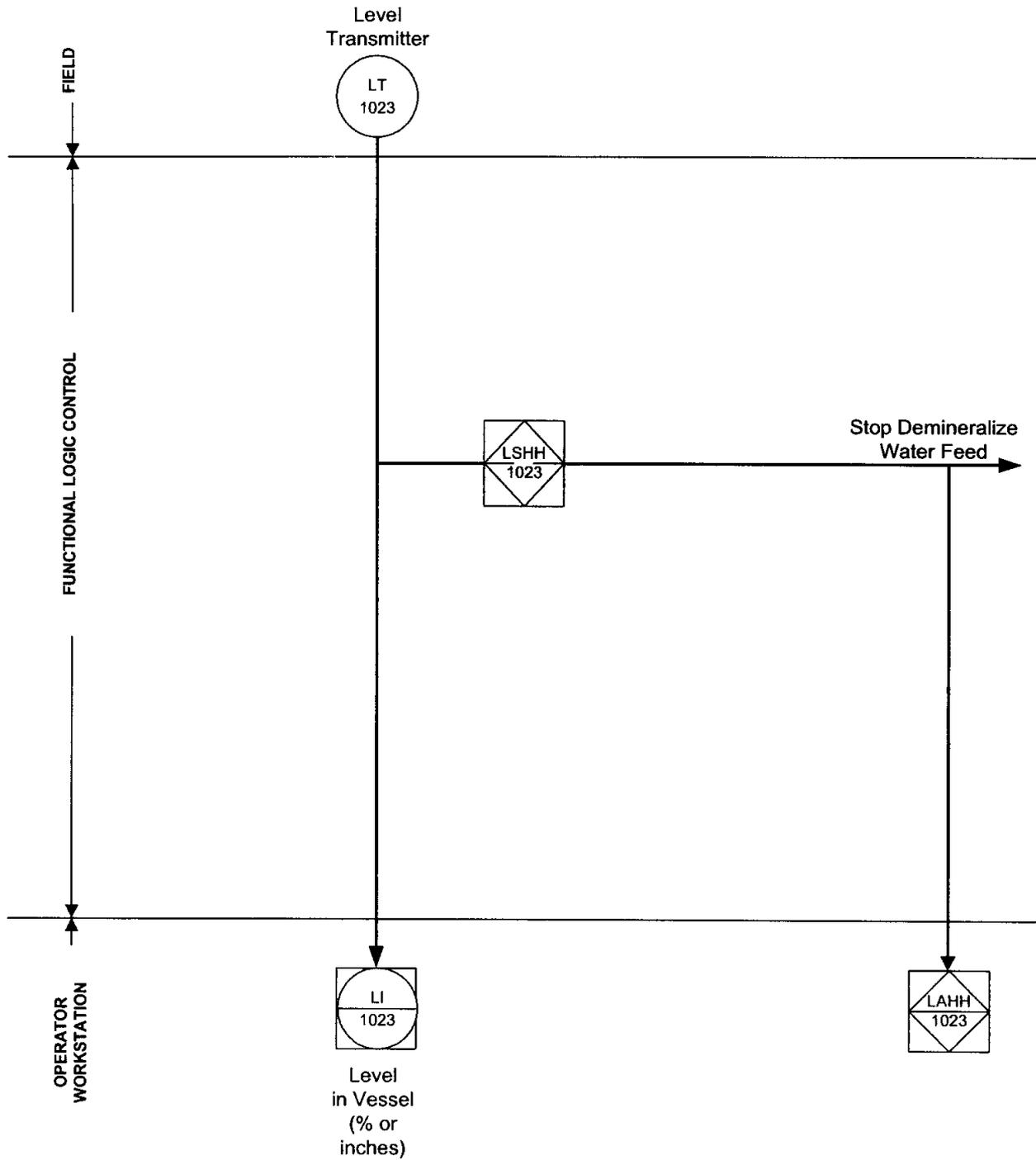


Figure 4 Level Measurement for the Pulse Jet Ventilation Drain Collection Vessel (PJV-VSL-00002)

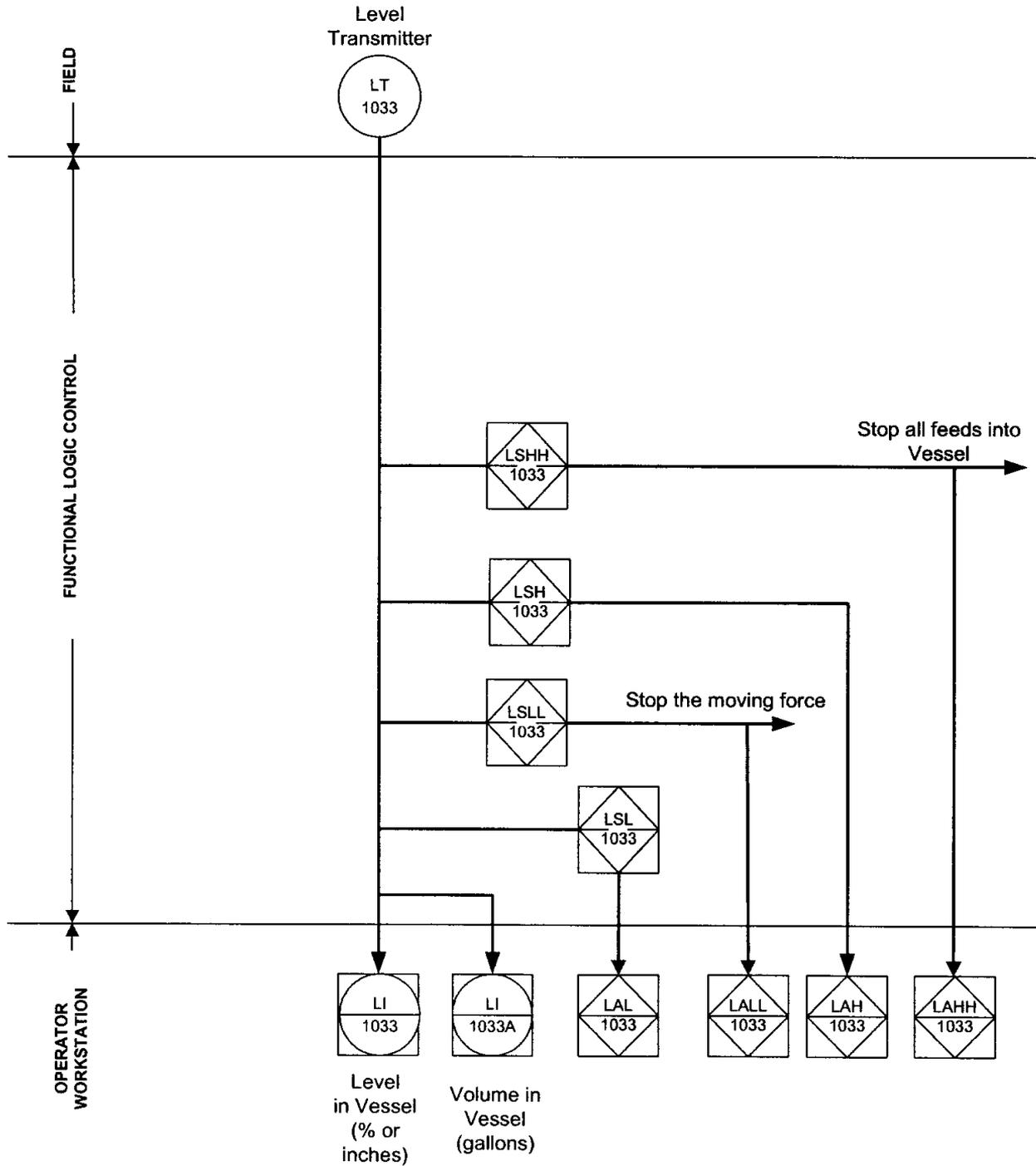


Figure 5 Level Measurement for the Pulse Jet Ventilation Drain Pump Bulge (PJV-BULGE-00001)

