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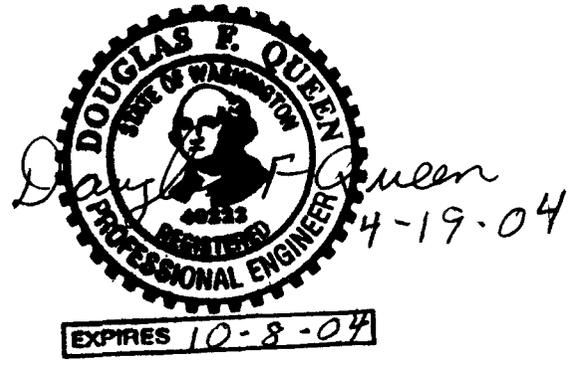
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## Notice

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## History Sheet

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## Glossary

Acquire	A command, under batch control, that reserves a group of equipment for that particular batch control.
Actual Volume	Volume of waste or process fluid in any vessel in gallons.
Available Space	Volume of waste or process fluid that any vessel can accommodate and still be lower than the upper operating limit (UOL), in gallons. Available space can be calculated as follows: <i>Available Space = UOL - Actual Volume</i> .
Available Volume	Volume of waste/process fluid that any vessel can transfer to another vessel and still be above the lower operating limit (LOL), in gallons. Available volume can be calculated as follows: <i>Available Volume = Actual Volume - LOL</i> .
Batch	The material that is being produced or that has been produced by a single execution of a batch process.
Batch Control	Control activities and control functions that provide a means to process (that is, an ordered set of processing activities) finite quantities of material over a finite period of time using one or more pieces of equipment.
Batch Process	A process that leads to the production of finite quantities 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.
Exception Handling	Those functions that deal with plant or process contingencies and other events that occur outside the normal or desired behavior of batch control.
Permissive	Interlock that allows a device to change state or a sequence to start. Once a device has changed state or a sequence has started, permissives have no further effect on the device or sequence.
Release	A command under a batch control that opens up a group of equipment for any batch control to acquire.
Trip	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, trips continue to have an effect on the device or sequence.

## Acronyms and Abbreviations

AEA	Atomic Energy Act of 1954
DOE	US Department of Energy
HS	hand switch
LALL	level alarm low low
LAW	low-activity waste
LCP	LAW concentrate receipt process system
LI	level indicator
LSLL	level switch low low
LT	level transmitter
LVP	LAW secondary offgas/vessel vent process system
LY	level relay
PCJ	process control system
PT	pretreatment (facility)

# 1 Introduction

This document describes the instrument control logic for tank and ancillary equipment in the low-activity waste (LAW) facility for the LAW concentrate receipt process system (LCP) associated with dangerous waste management. This document revision focuses on tank and ancillary equipment for the LCP system above the 0 ft elevation in the LAW facility.

## 2 Applicable Documents

WAC 173-303, *Dangerous Waste Regulations*, Washington Administrative Code, as amended.

## 3 Description

### 3.1 System Requirement

The tank and ancillary equipment associated with dangerous waste management in the LAW system above the 0 ft elevation of the LFP system consists of the following:

- LCP-VSL-00001 concentrate receipt vessel
- LCP-VSL-00002 concentrate receipt vessel
- LCP-BULGE-00001 concentrate receipt valve bulge
- LCP-BULGE-00002 concentrate receipt valve bulge
- LCP-BULGE-00003 concentrate receipt valve bulge

#### 3.1.1 Concentrate Receipt Vessel LCP-VSL-00001

The concentrate receipt vessel (LCP-VSL-00001) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0123. The contents of the vessel overflow via an overflow header to the C3/C5 drains/sump collection vessel (RLD-VSL-00004) in another cell, room L-B001B, at the -21 ft elevation.

The wet process C5 cell, room L-0123, supports a stainless steel liner sized to provide secondary containment. The welded vessel, process cell secondary containment, and the overflow system meet the requirement to minimize system leaks.

The concentrate receipt vessel (LCP-VSL-00001) is constructed of 316L stainless steel and receives treated Tank Farm liquid waste via coaxial lines from the treated LAW concentrate vessel (TCP-VSL-00001), at the pretreatment (PT) facility. During a batch process, when concentrate receipt vessel agitator (LCP-AGT-00001) receives permissives to operate, the vessel contents are agitated to provide a representative sample. The vessel is vented via a vessel ventilation header into the LAW secondary offgas/vessel vent process system (LVP).

The concentrate receipt vessel (LCP-VSL-00001) level is continuously monitored by redundant level transmitters LCP-LT-0131 and LCP-LT-0139. The operator selects the primary transmitter. This actual level signal inputs to the functional logic and batch controls and calculates actual volume. The process

control system (PCJ) monitors the level to control melter feed batch transfers. As part of the batch control, the operator releases and acquires the target vessel, melter 1 feed prep vessel (LFP-VSL-00001) or melter 2 feed prep vessel (LFP-VSL-00003) and initiates the transfer sequence using a concentrate receipt pump (LCP-PMP-00001A or LCP-PMP-00001B).

Once initiated, the PCJ system verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. Next, an automated process sample may be taken to document solids content and effluent characteristics. Before the sequence proceeds further, the PCJ system calculates the transfer (available) volume to assist the operator and verify that the volume will not overflow the selected target vessel available space. The transfer will end when either the level in the concentrate receipt vessel (LCP-VSL-00001) reaches its low-level functional logic control point, a batch is transferred, or the selected target vessel reaches its actual high-level batch control point. Low-low level trips will stop the concentrate receipt vessel agitator (LCP-AGT-00001) and concentrate receipt pump (LCP-PMP-00001A or LCP-PMP-00001B).

To prevent a possible overflow, the PCJ system alarms at two high-level setpoints. At high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Additionally, a high-high level during a procedural transfer from another vessel will initiate exception handling to mitigate concentrate receipt vessel (LCP-VSL-00001) overfill. Figure 1 depicts the instrumentation associated with the concentrate receipt vessel (LCP-VSL-00001).

### **3.1.2 Concentrate Receipt Vessel LCP-VSL-00002**

The concentrate receipt vessel (LCP-VSL-00002) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0124. The contents of the vessel overflow via an overflow header to the C3/C5 drains/sump collection vessel (RLD-VSL-00004) in another cell, room L-B001B, at the -21 ft elevation.

The wet process C5 cell, room L-0124, supports a stainless steel liner sized to provide secondary containment. The welded vessel, process cell secondary containment, and the overflow system meet the requirement to minimize system leaks.

The concentrate receipt vessel (LCP-VSL-00002) is constructed of 316L stainless steel and receives treated Tank Farm liquid waste via coaxial lines from the treated LAW concentrate vessel (TCP-VSL-00001), at the PT facility. During a batch process, when concentrate receipt vessel agitator (LCP-AGT-00002) receives permissives to operate, the vessel contents are agitated to provide a representative sample. The vessel is vented via a vessel ventilation header into the LVP system.

The concentrate receipt vessel (LCP-VSL-00002) level is continuously monitored by redundant level transmitters LCP-LT-0233 and LCP-LT-0252. The operator selects the primary transmitter. This actual level signal inputs to the functional logic and batch controls and calculates actual volume. The PCJ system monitors the level to control melter feed batch transfers. As part of the batch control, the operator releases and acquires the target vessel, melter 1 feed prep vessel (LFP-VSL-00001) or melter 2 feed prep vessel (LFP-VSL-00003) and initiates the transfer sequence using a concentrate receipt pump (LCP-PMP-00002A or LCP-PMP-00002B).

Once initiated, the PCJ system verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. Next, an automated process sample may be taken to document solids content and effluent characteristics. Before the sequence proceeds further, the PCJ system calculates transfer (available) volume to assist the operator and verify that the volume will not overflow

the selected target vessel available space. The transfer will end when either the level in the concentrate receipt vessel (LCP-VSL-00002) reaches its low-level functional logic control point, a batch is transferred, or the selected target vessel reaches its actual high-level batch control point. Low-low level trips will stop the concentrate receipt vessel agitator (LCP-AGT-00002) and concentrate receipt pump (LCP-PMP-00002A or LCP-PMP-00002B).

To prevent a possible overflow, the PCJ system alarms at two high-level setpoints. At high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Additionally, a high-high level during a procedural transfer from another vessel will initiate exception handling to mitigate concentrate receipt vessel (LCP-VSL-00002) overflow. Figure 2 depicts the instrumentation associated with the concentrate receipt vessel (LCP-VSL-00002).

### **3.1.3 Concentrate Receipt Valve Bulge LCP-BULGE-00001**

The concentrate receipt valve bulge (LCP-BULGE-00001) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. Treated Tank Farm liquid waste is received via coaxial lines from the treated LAW concentrate vessel (TCP-VSL-00001), at the PT facility, then enters the C3/C5 drain collection cell room L-B001B at the -21 ft elevation, continues to pour cave cooling room L-B030 at the -21 ft elevation, passes up to wet process C5 cell room L-0123, and then continues as single-wall lines up to the concentrate receipt valve bulge (LCP-BULGE-00001), at the 28 ft elevation. The concentrate receipt valve bulge (LCP-BULGE-00001) is then connected by through-floor piping back down to process wet cell concentrate receipt vessels (LCP-VSL-00001 and LCP-VSL-00002).

During off-normal operation any bulge drain volume contents will overflow via through-floor piping into the sump (RLD-SUMP-00029) at the 2 ft elevation in the enclosed wet process C5 cell, room L-0123.

### **3.1.4 Concentrate Receipt Valve Bulge LCP-BULGE-00002**

The concentrate receipt valve bulge (LCP-BULGE-00002) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. The concentrate receipt valve bulge (LCP-BULGE-00002) is connected by through-floor piping to the process wet cells. The transfer pump (LCP-PMP-00001A or LCP-PMP-00001B) discharge can routinely be routed to either the melter 1 feed prep vessel (LFP-VSL-00001) or the melter 2 feed prep vessel (LFP-VSL-00003). Sampling is provided using a sampling leg off the pump discharge line to the autosampler unit (ASX-SMPLR-00013).

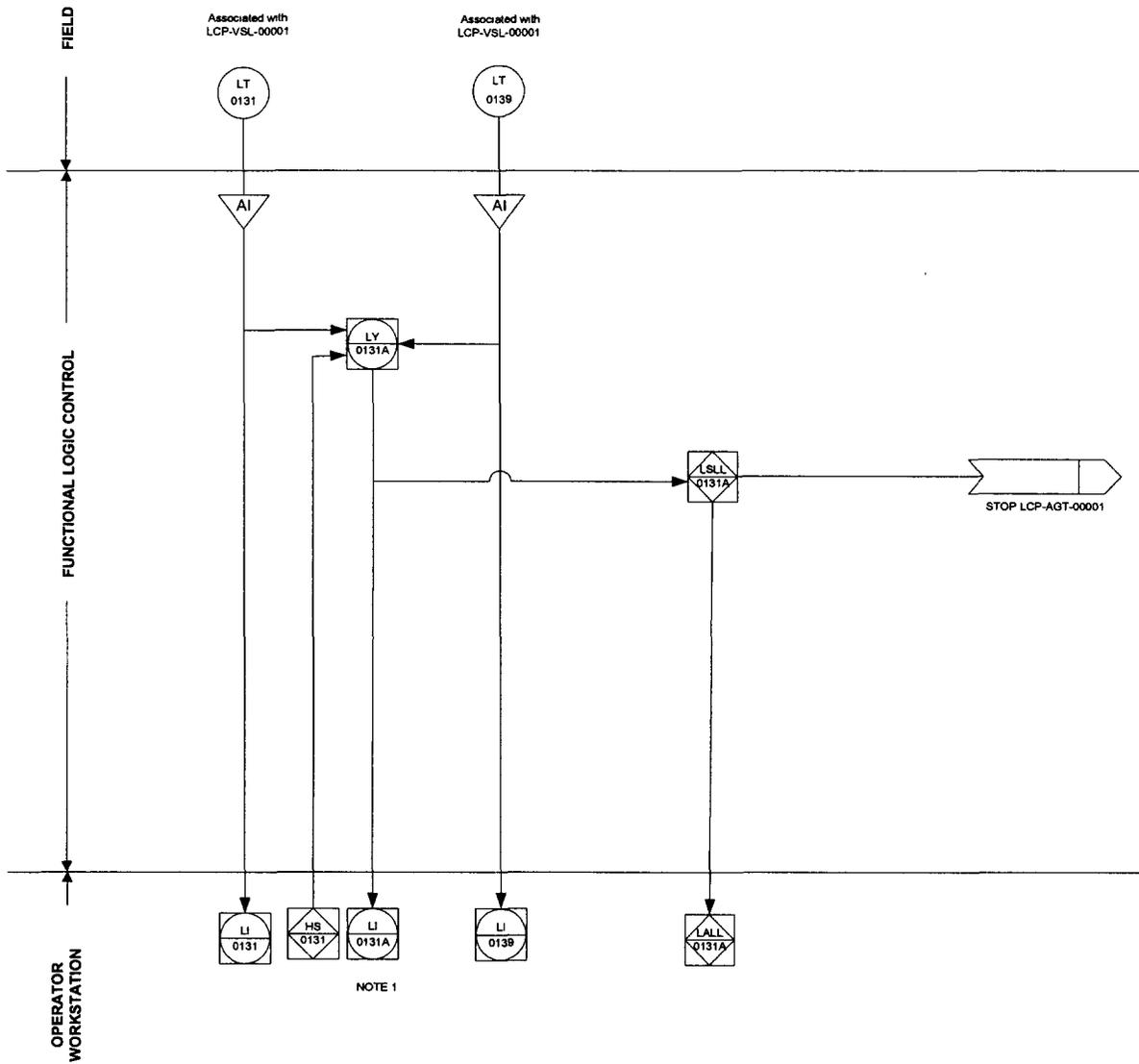
During off-normal operation any bulge drain volume contents will overflow via through-floor piping into the sump (RLD-SUMP-00029), at the 2 ft elevation in the enclosed wet process C5 cell, room L-0123.

### **3.1.5 Concentrate Receipt Valve Bulge LCP-BULGE-00003**

The concentrate receipt valve bulge (LCP-BULGE-00003) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. The concentrate receipt valve bulge (LCP-BULGE-00003) is connected by through-floor piping to the process wet cells. The transfer pump (LCP-PMP-00002A or LCP-PMP-00002B) discharge can routinely be routed to either the melter 1 feed prep vessel (LFP-VSL-00001) or the melter 2 feed prep vessel (LFP-VSL-00003). Sampling is provided using a sampling leg off the pump discharge line to the autosampler unit (ASX-SMPLR-00013).

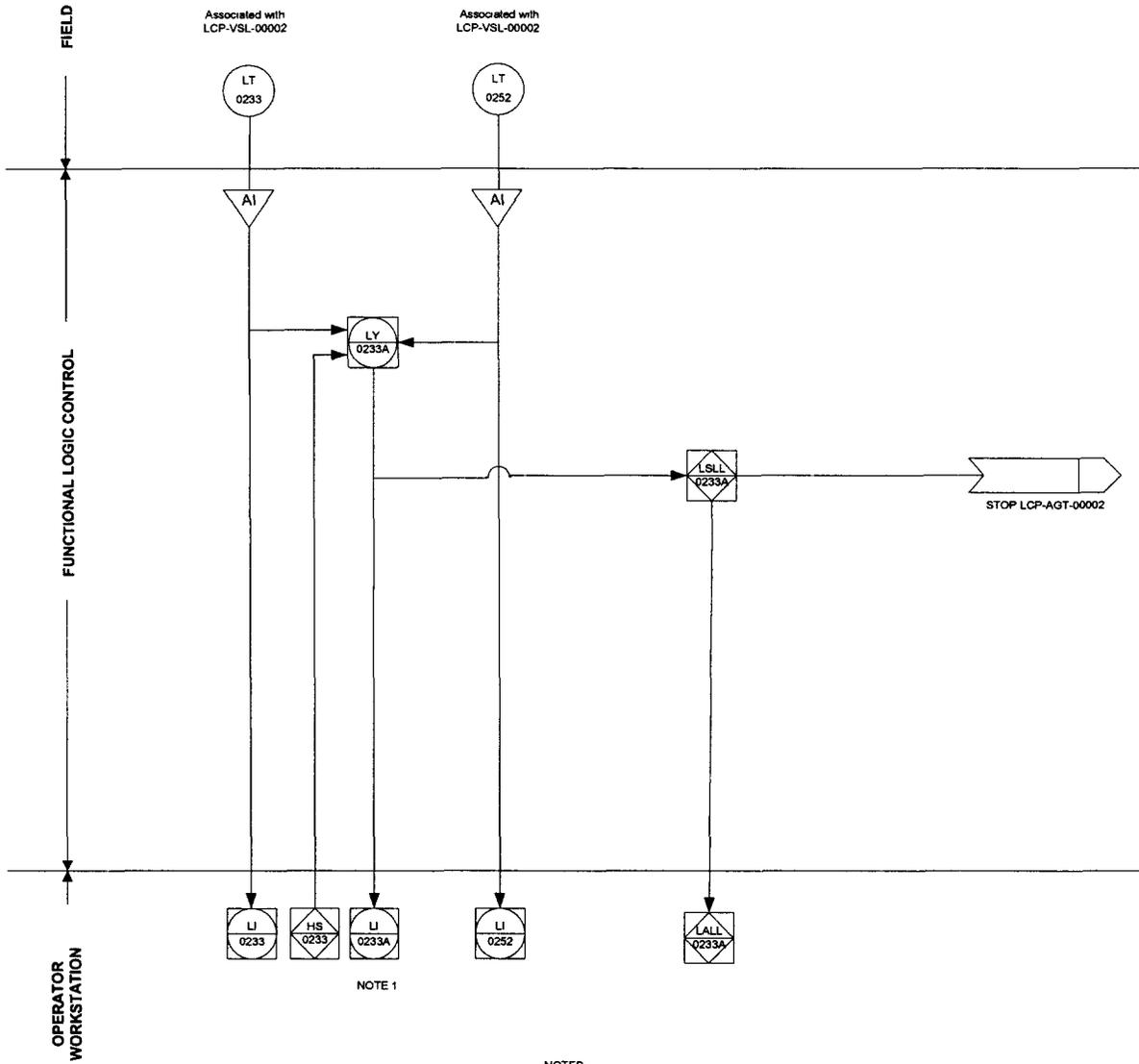
During off-normal operation any bulge drain volume contents will overflow via through-floor piping into the sump (RLD-SUMP-00032), at the 2 ft elevation in the enclosed wet process C5 cell, room L-0124.

Figure 1 Level Control for Vessel LCP-VSL-00001



**NOTES**  
 1 ON HIGH-HIGH LEVEL PCJ CONTROL SYSTEM BATCH CONTROL SHALL ASSIST OPERATOR TO PREVENT VESSEL OVERFILL.

Figure 2 Level Control for Vessel LCP-VSL-00002



NOTES  
 1 ON HIGH-HIGH LEVEL PCJ CONTROL SYSTEM BATCH CONTROL  
 SHALL ASSIST OPERATOR TO PREVENT VESSEL OVERFILL