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LOW LEVEL WASTEWATER TREATMENT FACILITY PROCESS  
CONTROL OPERATIONAL TEST REPORT

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LOW LEVEL WASTEWATER TREATMENT FACILITY PROCESS CONTROL  
OPERATIONAL TEST REPORT

G. G. BERGQUIST

WESTINGHOUSE HANFORD COMPANY, Richland, WA 99352  
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Abstract: Report documenting improved operating control system operational testing. MICON is a trademark of MICON-Powell Process Systems Incorporated. SUN is a trademark of SUN Microsystems Incorporated.

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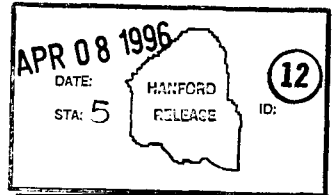
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Date



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## 1. Introduction

This test report documents the results obtained while conducting operational testing of a new TK-102 level controller and total outflow integrator added to the MICON software that controls the Low Level Wastewater Treatment Facility (LLWTF). The test was performed with WHC-SD-CP-OTP-154, "PEP Low Level Wastewater Treatment Facility Process Control Operational Test". A complete test copy is included in appendix A.

The new TK-102 level controller provides a slave signal, hereafter referred to as cascade mode, to the treatment train inlet flow controller (FIC-1) which enables the water treatment process to run for long periods without continuous operator monitoring. The test successfully demonstrated the functionality of the new controller under standard and abnormal conditions expected from the LLWTF operation.

In addition, a flow totalizer is now displayed on the LLWTF outlet MICON screen which tallies the process output in gallons. This feature substantially improves the ability to retrieve daily process volumes for maintaining accurate material balances.

## 2. Test Contributors

Several key test engineers and MICON operators had significant contribution to this test. Without their help the timely completion would not have been possible. Thanks to Michelle Winstead, Debbie Rettig, Steve Stanper, Kevin Patterson, Greg Silvan, Ginna Gard, Rick Oliver, Carl Ramon, Steve Rust, Robin Scott, and Brenda Brown.

## 3. Test Chronology

Table 1 lists the dates and approximate test durations associated with important test items.

Test Item	Start Date	Finish Date	Duration
Verify Totalizer - Shift Test	10/19/95	10/19/95	8 hours
Verify Totalizer - Day Test	10/21/95	10/22/95	19 hours
Baseline Configuration - Filter/Pump Comb.	10/18/95	11/1/95	38 hours
Vary LIC-102 Setpoint	10/20/95	12/24/95	16 hours
Vary FIC-102 Setpoint	10/24/95	10/24/95	4 hours
Vary LIC-101 Setpoint	10/25/95	10/25/95	7 hours
Upset Condition Testing	11/6/95	11/6/95	8 hours

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#### 4. Test Result Discussion

A written testimonial, given below, was prepared after each day of testing to supplement the data collected and to document test engineer observations.

##### October 18, 1995

LLWTF was placed in shutdown mode at 0900 hrs for downloading of the new MICON software configuration as outlined in Engineering Change Notice 191433. TK-101 was pumped down to 3.2 feet from the standby mode in order to provide a 30 minute window for the MICON engineers to re-configure the system. Software installation lasted only 15 minutes, which included the instrument tech making a few jumper configuration changes to a MICON component. Downloading the software satisfied the final pre-requisite action for commencing test activities.

A pre-job briefing was conducted and the LLWTF was placed into the cascade mode at 1300 hrs to obtain the first set of baseline performance data. The level in TK-101 lowered slowly to 3.5 ft at first because the new TK-102 level controller, LIC-102, crept above its setpoint which opened FCV-1 to about 15 gpm. The setpoint of the recycle from TK-102 to TK-101 (FIC-102) controller was at 6 gpm and appeared too low based on system response. The interaction between the TK-101 level, TK-102 level, and FIC-102 setpoints was quite evident from just a few hours of testing.

##### October 19, 1995

Another pre-job briefing was conducted today since new MICON operators were present. The LLWTF was placed into the cascade mode at 0800 hrs with LIC-102 set at 4 feet, LIC-101 set at 4 feet, and FIC-102 set at 10 gpm. System was very stable during 5 hours of operation. At 1330 hrs both filters and both treatment trains were opened and stability was maintained. Test terminated for the day at 1500 hrs.

##### October 20, 1995

Another pre-job briefing was conducted today since a new MICON operator was present. The LLWTF was placed into the cascade mode at 0800 hrs with LIC-102 set at 5 feet, LIC-101 set at 4 feet, and FIC-102 set at 10 gpm. Started parameter variation part of test by increasing the LIC-102 setpoint to 7.0 feet (2 feet increase) at 1130 hrs. Inlet flow controller FIC-1 reduced to 0 gpm as expected to allow the TK-102 level to increase. At 1330 hrs the TK-101 level began rising rapidly from a 291-Z sump discharge, the second pump started at the high level alarm interlock (5 feet). The TK-102 level had not yet reached 7 feet by the time the interlock started the second pump. After the second pump had been on for a few minutes the level in TK-102 started to approach 7 feet a bit quicker; therefore, FIC-1 responded by allowing water to enter the LLWTF for treatment. The level in TK-101 only reached 5.2 feet during the 291-Z discharge. When FCV-1 (FIC-1) had opened to about 14 gpm a high dP alarm sounded for filter F202A. The operator opened

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filter F202B to reduce the pressure and clear the alarm. System stabilized by 1500 hrs when the test was terminated for the day.

#### October 23, 1995

Another pre-job briefing was conducted today since a new MICON operating crew was present. The LLWTF was placed into cascade mode at 0900 hrs with very little water present in TK-101 (3.4 feet) and TK-102 (4 feet). FIC-102 setpoint was 8 gpm. The test attempted to bring the TK-102 level to 9 feet by increasing the LIC-102 setpoint in smaller increments than 2 feet. At 1045 hrs we noticed that FCV-2 was open at 5 gpm when the LIC-102 signal to FCV-1 called for 0 gpm. The OTP was redlined to place FCV-2 in manual and adjust output to 0% during test evolutions and return to auto when done for the day. LIC-102 does not cascade to the second inlet flow control valve FCV-2. Incremental changes of 0.5 feet in LIC-102 slowly brought TK-102 level up to 8 feet with TK-101 level staying between 3.9 and 4.1 feet. System stabilized by 1500 hrs when the test was terminated for the day.

#### October 24, 1995

The LLWTF was placed into the cascade mode at 0740 hrs. The parameter variation started by lowering the TK-102 level setpoint from 7 feet to 5 feet in one foot increments. FIC-102 setpoint was 12 gpm and LIC-101 setpoint was 4 feet. The decrease in LIC-102 setpoint resulted in a rapid increase to the FCV-1 flow rate nearing 25-30 gpm and no override control present from pressure controller, PIC-2. The train pressure alarm sounded at 11 psig and was cleared by opening the second treatment train. Also, this variation in the TK-102 level setpoint resulted in a TK-101 low level interlock to shut off the pump. The system was stabilized by adjusting the TK-102 setpoint to the current tank level.

The next parameter variation involved increasing the FIC-102 setpoint from 12 gpm to 20 gpm while holding LIC-101 and LIC-102 constant. This action had an immediate impact on the TK-101 level raising it to 4.7 feet which resulted in the LIC-101 controller in driving LCV-1 wide open. The TK-101 level eventually dropped to 4.3 feet before again rising to 4.95 feet. Without using the second TK-101 pump the system did not stabilize. This parameter variation test was terminated after about an hour.

The next parameter variation involved decreasing the FIC-102 setpoint from 12 gpm to 7 gpm. The system stabilized and operated smoothly for an hour prior to ending the test for the day at 1400 hrs.

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October 25, 1995

The LLWTF was placed into the cascade mode at 0815 hrs. Parameter variation began by increasing the TK-101 level setpoint from 4.0 to 4.2 feet and then decreasing from 4.0 feet to 3.8 feet in the afternoon. The system was stable and FIC-102 and LIC-102 were held constant at 12 gpm and 6.4 feet, respectively.

Additionally, in the afternoon another attempt was made to drop the TK-102 level setpoint by 0.8 feet. We realized that the PIC-2 controller had been in manual yesterday during this test. Again, even with PIC-2 in auto (setpoint 10 psig), it did not limit the rapid increase in the FCV-1 valve position. A high pressure alarm at 11 psig sounded and was cleared by opening the second treatment train. However, after opening the second train, the TK-101 level only dropped to 3.2 feet before the system stabilized and test activities for the day were stopped at 1500 hrs.

Greg Silvan corrected the MICON historian to recognize the TK-102 level data point. This data point had not been saved to the SUN hard drive file from earlier testing activities.

October 26, 1995

Another pre-job briefing was conducted since another MICON operator was present today. The LLWTF was placed into the cascade mode at 0815 hrs. LIC-101 was set at 4 feet, LIC-102 was set at 6.4 feet, and FIC-102 was set at 12 gpm. Operated until 1400 hrs to collect information from TK-102 level into the historian file. Turned on both pumps at 1300 hrs and system response was good with TK-101 level near 4 feet.

October 31, 1995

Another pre-job briefing was conducted since another MICON operator was present today. The LLWTF was placed into the cascade mode at 0800 hrs. LIC-101 was set at 4 feet, LIC-102 was set at 6.4 feet, and FIC-102 was set at 9.8 gpm. Operated until 1500 hrs to collect baseline information into the historian file.

November 1, 1995

Another pre-job briefing was conducted since another MICON operator was present today. The LLWTF was placed into the cascade mode at 0815 hrs. LIC-101 was set at 4 feet, LIC-102 was set at 4.6 feet, and FIC-102 was set at 9.5 gpm. Operated until 1415 hrs to collect baseline information into the historian file.



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November 6, 1995

The LLWTF was placed into cascade mode at 0915 hrs. LIC-101 was set at 4 feet, LIC-102 was set at 5.4 feet, and FIC-102 was set at 12.1 gpm. Two upset conditions were tested to gain performance information.

The first involved shutting off pump P101B so that both pumps were off. Hand switch HS-101 had P101A selected as lead pump. TK-101 began filling. As expected LIC-101 slowly opened LCV-1 because of the increase in the process variable above the setpoint. However, LIC-102 did not throttle down FIC-1 when it was decreasing below the TK-102 setpoint. Valve FCV-1 was 100 % open even though a setpoint near zero was being received from the cascade controller LIC-102. This test was terminated prior to TK-101 reaching the high level interlock (5 ft) and starting the pump. If the pump would have started a pressure shock wave would have hit the pipe elbow downstream of valve FCV-1, since it was wide open. This simulation tested a very unlikely event, a failure of the HS-101 lead pump interlock. Normally, if a pump fails in the field the other pump will automatically start with only a 1-2 second delay. However, it does prove we do not want to shut off a pump to help control level in TK-101 without first taking the system out of cascade mode and closing FCV-1 and opening LCV-1 prior to starting a pump.

The second test involved evaluating system response to a discharge of the 291-Z sump. Fortunately, steam turbine testing was taking place today, which allowed the 291-Z sump to start and stop while in the automatic mode. The cascade mode system responded nicely without intervention by the operator or engineer. TK-101 did rise to 5.1 ft and the second pump automatically started. The system stabilized after about 30 minutes.

5. **Test Conclusions**

Flow Totalizer

Two separate length tests were conducted for a comparison of the MICON historian data versus the new flow totalizer. MICON historian data was retrieved manually by verifying inlet flowrate (FRC-1) and time information to calculate a volume processed through the facility. The differences were 0.4% and 1.3% for an 8 hour and 19 hour test, respectively. These differences are acceptable because the inlet flowrate controller usually deviates about 0.5 gpm around a given setpoint.

Cascade Control

With the TK-102 to TK-101 flow controller (FIC-102) set at half the pump flow capacity (25-30 gpm) from TK-101 to TK-102, the control system was stable during the cascade control mode. When FIC-102 was set outside 8-15 gpm range, the control system became unstable because the TK-101 level varied enough to activate the pump level shut-off interlocks.

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The operational test also varied setpoints on the TK-101 level and TK-102 level controllers outside of what has been normally allowed by current LLWTF operating practice. The control system became unstable under some of the large setpoint variations, which demonstrated the system operating boundaries. Observations made during the test supports operating the LLWTF in the cascade mode for periods between 3-4 hours without making system adjustments. However, timely alarm response (5-10 minutes) still is required.

Abnormal Condition Response

The cascade mode was able to respond to a water surge in TK-101 from the 291-Z sump system. The 291-Z sump system discharges water to TK-101 periodically and has typically resulted in a high TK-101 level alarm. When TK-101 reaches the high level alarm setpoint of 5 feet, the backup pump starts to assist in lowering the tank level.

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APPENDIX A

**SUPPORTING DOCUMENT**

1. Total Pages *1468*

2. Title

LOW LEVEL WASTEWATER TREATMENT FACILITY PROCESS  
CONTROL OPERATIONAL TEST

3. Number

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Pg 10 of 39

4. Rev No.

0

5. Key Words

LLWTF, OTP, CASCADE CONTROL, 243-Z, MICON

6. Author

Name: M. L. Winstead

*M. L. Winstead*  
Signature

Organization/Charge Code 15530/K6002

7. Abstract

Document provides instructions for testing the operability of the Low Level Wastewater Treatment Facility new control system and flow totalizer.

8. RELEASE STAMP

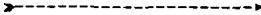
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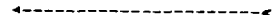
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July 25, 1995



THINK **ALARA** IN ALL WE DO

1:03pm



**1.0 TEST PLAN**

1.1 This Operability Test Procedure (OTP) provides instructions for testing operability of the additional TK-102 level controller and total outflow integrator added to the MICON software that controls the Low Level Wastewater Treatment Facility (LLWTF) located in 243-Z and 243-ZA at the Plutonium Finishing Plant (PPF).

The new controller will control Tank 102 level and the setpoint will be cascaded to the flow indicator controller's (FIC-1) setpoint in the process. The additional controller should enable the facility to be run in automatic by having the level in TK-102 controlling the flowrate into the LLWTF through flow control valve FCV-1. The test will ensure that the new controller scheme can handle the process and information from the test will be considered when deciding whether the process will require constant monitoring.

1.2 The test objectives are to functionally test the new proposed control scheme. The LLWTF control system will be tested with various combinations of pumps, treatment trains, filters, etc., to verify that the control scheme is completely operable and can handle small system upsets. Data will be collected in order to provide technical information on the amount of periodic monitoring the process will need.

Another test objective will functionally test the flow totalizer. This new display feature will combine the information from both flow transmitters (FT-1 and FT-2) to present a facility throughput value in gallons.

**2.0 SAFETY**

A pre-job safety meeting shall be conducted and documented on Table 1 by the Test Engineer prior to work start to discuss the scope of work and the safety issues. This pre-job will be repeated for subsequent days/crews as the test progresses and the need arises. Applicable sections of this OTP shall be read and discussed in detail by all personnel involved with their performance.

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**3.0 TOOLS, EQUIPMENT, AND SUPPLIES**

The 243-ZA Sump is a Non-Permit confined space. Entry shall be in conformance with WHC-CM-4-40, section 4.0.

Applicable Radiation Work Permit

**4.0 PROCEDURE**

The Test Engineer shall be selected from PFP Engineering and has overall responsibility and authority over the OTP performance. Testing will be conducted by the Test Engineer (TE), Nuclear Operations, Power Operations, and MICON Engineer personnel. Test section completion verification will be signed by the Cognizant Engineer or designee in the space provided. Data recording will be performed by TE or designee.

Adjustments to the OTP may be necessary in the field as the test run progresses. Therefore, the Test Engineer is permitted to authorize test site personnel to ink in changes to the OTP with the concurrence of the Cognizant Engineer and Cognizant Manager and any additional approvals required by the Approval Designator given to the change.

The following tests can be performed in any order.

Existing data sheets or applicable test sections may be copied and added to this test plan if needed to re-perform a section of the test. The page number of the page added will be appended with an alphabetical (a-z) suffix.

**HOLD POINTS:** Prerequisite actions that must be completed before testing can begin.

1. Prefilter configuration has been corrected by JCS work package number 27-95-01018.

*Hug Bengtson 10/18/95*  
Cognizant Engineer / Date

2. MICON software changed to reflect configuration on ECN # 191433.

*Christin Scayon 10/18/95*  
Cognizant Engineer / Date

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**A. VERIFY TOTALIZER**

SHIFT TEST

1. Record FQ-2 (flow totalizer), and date and time reading is taken on data sheet 1.
2. Continue to perform the OTP and at the end of day shift record FQ-2 (flow totalizer), and date and time reading is taken on data sheet 1.
3. Test engineer will record actual data from the MICON historian to compare with FQ-2.

DAY TEST (24-Hour)

4. Record FQ-2 (flow totalizer), and date and time reading is taken on data sheet 1.
5. Allow LLWTF to run for at least 24 hour period before recording FQ-2 (flow totalizer), and date and time reading is taken on data sheet 1.
6. Test engineer will record actual data from the MICON historian to compare with FQ-2.
7. Test engineer will review the data from both tests and determine if these two tests need to be repeated or additional testing needs to be done.
  - a. Record information from tests on data sheet 1.

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July 25, 1995

1:03pm

**B. BASELINE PERFORMANCE OF THE CASCADE CONTROL SYSTEM**

1. If the LLWTF is not operating start up process by procedure Z0-106-101, Task B. *AL=MM GS Beg at 10/22/91*
2. When system has stabilized, place FIC-1 in CASCADE. *and FIC-2 in manual, OTR out*
3. Set LIC-102 in AUTO. Allow system to stabilize and monitor process.
  - a. Place LIC-102 in MANUAL, FIC-1 in AUTO *FIC-2 into Auto* and operate LLWTF facility per plant operating procedure (Z0-106-101), when the following tests are done for the day.
4. Run control scheme up to 8 hrs (dayshift). Make few adjustments and let the system control itself.
  - a. Record information of this control scheme on the data sheet and any problems that occur.
5. Open both trains and both filters.
  - a. Open second pre-filter by positioning hand switch, HS-28 (F-202A) or HS-29 (F-202B) to OPEN.
  - b. Open second train by positioning hand switch HS-30 (Train 1) or HS-31 (Train 2) to OPEN.
  - c. Run control scheme up to 8 hrs. (dayshift). Make few adjustments to allow the control system to function.
  - d. Record information of this control scheme on the data sheet and any problems that occur.

**C. VARIATION OF PARAMETERS USING THE CASCADE CONTROL SCHEME**

1. If the LLWTF is not operating start up process by procedure Z0-106-101, Task B. *AL=MM GS Beg at 10/22/91*
2. When system has stabilized, place FIC-1 in CASCADE. *and FIC-2 into manual, OTR out*
3. Set LIC-102 in AUTO. Allow system to stabilize and monitor process.
  - a. Place LIC-102 in MANUAL, FIC-1 in AUTO *FIC-2 into Auto* and operate LLWTF facility per plant operating procedure (Z0-106-101), when the following tests are done for the day.

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4. Vary TK-102 level by adjusting LIC-102 setpoint (SP/W) to 5 feet, 7 feet, and 9 feet to see how the system responds. Additional setpoints can be tested if needed, do not go below 5 feet. Allow system to stabilize after making each adjustment.
  - a. Record information of the different control schemes on the data sheet 3 and any problems observed.
5. Vary flow from T-102 to T-101 through FCV-3 by adjusting FIC-102 set point (SP/W) to 5 gpm, 10 gpm, 20 gpm to see how the system responds. Additional setpoints can be used if needed. Allow system to stabilize after making each adjustment.
  - a. Record information of this control scheme on the data sheet 3 and any problems observed.
6. Vary TK-101 level by adjusting LIC-101 setpoint (SP/W) to 3.8 feet, 4.0 feet, 4.2 feet to see how the system responds. Additional setpoints can be used if needed. Allow system to stabilize after making each adjustment.
  - a. Record information of this control scheme on the data sheet 3 and any problems observed.
7. Optimize process controls by varying LIC-102, FIC-102, and LIC-101 setpoints. Record information on data sheet 3 of control schemes.

**D. UPSET CONDITIONS USING THE CASCADE CONTROL SCHEME**

1. LLWTF needs to be operating and stabilized in the CASCADE control scheme. If plant is not in CASCADE control scheme, start up per steps below.
  - a. If the LLWTF is not operating start up process by procedure Z0-106-101, Task B. *AL=VA*
  - b. When system has stabilized, place FIC-1 in CASCADE. *668 10/27/95  
mjd 10/23-95  
FIC-2 into manual, 02*
  - c. Set LIC-102 in AUTO. Allow system to stabilize and monitor process.
  - d. Place LIC-102 in MANUAL, FIC-1 in AUTO *FIC-2 into AUTO* and operate LLWTF facility per plant operating procedure (Z0-106-101), when the following tests are done for the day.
2. The following actions could cause LLWTF control system to not be able to stabilize itself. After each scenario is performed system will need to stabilize before performing the next scenario. Record initial conditions for each of the below scenarios on Data Sheet 4.

August 8, 1995

7:47am

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OFF-NORMAL CONDITIONS

3. Have Power Operator pump 291-Z sump to observe system's flow increase response.
  - a. Observe how system handles a large volume of water. Record any observations on Data Sheet 4.
4. Turn off pump to simulate failure or loss of pump.
  - a. Shut both pumps off by setting HS-101A and HS-101B to OFF.
  - b. Verify that both pump P-101A and P-101B start on T-101 high level alarm.
  - c. Shut off pump P-101B by setting HS-101B to OFF. Observe how system handles T-101 high level alarm condition with one pump. Record relevant observations on Data Sheet 4.
5. Place FIC-102 to MANUAL to place valve FCV-3 into manual mode and then adjust flowrate to 15 gpm.
  - a. If system was able to handle large flow of water from 291-Z pump continue, if not go to step 6.
  - b. Have Power Operator pump 291-Z sump.
  - c. If T-101 receives a high high alarm, verify that FCV-3 has closed.
  - d. Continue to observe how the system operates with out the use of FCV-3. Record any observations or comments on Data Sheet 4.
6. Perform any additional upset conditions that need to be done based on information gathered from this test.

*delete*  
*AKB*  
*11/22/95*  
Approval Designator = NA  
*see just below*  
*MWJ*  
*1/22/96*

**E. FINAL TESTING OF THE CASCADE CONTROL SCHEME**

Before the test is complete tuning of the controllers may need to be done and some sections of the test repeated. Also, some tests may need to be repeated or further testing done to gain more information on the cascade control scheme.

1. Repeat any parts of the test that need to be performed with information gained from earlier testing.
2. Test is completed when the test engineer and the MICON engineer are satisfied with how the cascade control scheme operates.

*step 5 of the off-normal testing is not necessary after witnessing several days of cascade control performance. The situation envisioned in step 5 is highly unlikely and would only result from multiple system failures.*

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August 9, 1995

8:29am

*AKB*  
*11/22/95*

**F. UPDATE OPERATING PROCEDURES**

1. Cognizant Engineer will need to update all LLWTF operating procedures prior to completing test procedure.

**5. OTP ACCEPTANCE**

- A. All LLWTF operating procedures update have been completed.
- B. The undersigned concur the OTP was completed successfully and are satisfied with the cascade control scheme and flow totalizer.

Cognizant Engineer GREG BERGQUIST / *Greg Bergquist* / Date 1/10/96  
 Print Signature

Cognizant Engineer MARK W GIBSON / *Mark W Gibson* / Date 1/22/96  
 Manager Print Signature

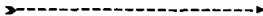
Operations Manager MD TALBOT / *MD Talbot* / Date 1/22/96  
 Print Signature

MICON Engineer ERWIN ICAYAN / *Erwin Icayan* / Date 1/22/96  
 Print Signature

RECORD COPY

August 9, 1995

8:29am



**TOTALIZER DATA SHEET**  
(DATA SHEET 1)

**SHIFT TEST**

FQ-2:	<u>start</u> 23020	<u>stop</u> 25667	(2647 gallons)
Date:	<u>10/12/95</u>	<u>10/12/95</u>	
Time:	<u>1740</u>	<u>2152</u>	Diff = $\frac{2658 - 2647}{2658} = 0.4\%$
Actual Flow:	<u>2658 gallons</u> <del>2647 gallons</del>	10.55 gpm for 4hrs 12 minutes	

**DAY TEST**

FQ-2:	<u>Start</u> 50324	<u>End</u> 62532	(12208)	<u>flow rates (gpm)</u> 10.7 10.8 10.6 10.7 $\bar{x} = 10.77$ gpm 11.1 10.6 10.5
Date:	<u>10/21/95</u>	<u>10/22/95</u>		
Time:	<u>12:45</u>	<u>0754</u>		Diff = $\frac{12374 - 12208}{12374} = 1.3\%$
Actual Flow:	<u>10.77 gpm for 19 hrs 9 min</u> <del>9 hours 12 minutes</del>		(12374)	

**ADDITIONAL TEST**

Type: \_\_\_\_\_

FQ-2: \_\_\_\_\_

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Actual Flow: \_\_\_\_\_

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OTP APPROVAL DESIGNATOR Q	PFP LOW LEVEL WASTEWATER TREATMENT FACILITY. (PROCESS)	WHC-SD-CP-OTR-154 REV-0 <sup>66B</sup> PAGE 12 OF 14 27 of 39
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**BASELINE PERFORMANCE DATA SHEET  
(DATA SHEET 2)**

CONTROL SCHEME/ COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	Filter OPEN		PDI-202	Train OPEN		PIC-2
							F202A	F202B		1	2	
Low FIC-102 setpoint caused LIC-101 level to drop near 3.6 ft. FIC-1 up to 15 gpm.	10/18/95	Start 1252	4.0	6.0	3.9	8.0	open	close	2.1	open	close	1.35
Filter 202B changed & leak tested at 1325 hrs. Continuing to use F-202A	10/18/95	1422	4.1	6.0	3.48	12.4	open	close	3.6	open	close	3.20
TK-102 cycling between 4.0-4.5. TK-101 cycling between 3.5-4.0	10/18/95	1510	4.1	6.0	3.61	13.8	open	close	4.2	open	close	3.74
Test stopped at 1530 for day. LIC-102 setpoint returned to 0, manual. FIC-1 set to Auto	10/18/95	1526	3.8	6.0	3.96	9.0	open	close	2.6	open	close	1.81
Placed into cascade, using element controllers, but did up FIC-102 to 10 gpm	10/19/95	START 0813	4.2	10.0	4.05	7.5	OPEN	CLOSE	3.3	open	CLOSE	1.4
Water in let increased, went up to 4.75 gpm. FIC-102 set to 10 gpm.	10/19/95	0952	4.5	10.0	4.70	15.5	open	close	7.1	open	CLOSE	6.5
System seems stable	10/19/95	1126	4.0	10.0	4.06	10.2	open	close	3.3	open	close	2.0
System stable	10/19/95	1330	4.30	10.0	4.00	14.1	open	close	4.9 14.1 <sup>allow</sup> 10-11-95	open	close	4.2
Both trains + filters open	10/19/95	1335	4.07	10.00	4.16	10.	open	open	1.1	open	open	1.4

August 1, 1995

9:37am

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OTP APPROVAL DESIGNATOR Q	PEP LOW LEVEL WASTEWATER TREATMENT FACILITY (PROCESS)	WHC-SD-CP-OTR-154 REV-0 668 PAGE <del>12 of 14</del> 28 of 39
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BASELINE PERFORMANCE DATA SHEET  
(DATA SHEET 2)

Test stopped at 1518

CONTROL SCHEME/ COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	Filter OPEN		PDI-202	Train OPEN		PIC-2
							F202A	F202B		1	2	
Both Trains Both filters	10/19/95	1516	3.94	10.17	4.09	2.05	open	open	0.58	open	open	0.91
Started test - put into cascade on existing set points	10/20/95	0808	4.9	10.0	4.15	11.1	open	close	5.3	open	close	1.6
Put LIC-102 into to 5.0 to run variation test	10/20/95	0842	4.9	10.2	4.15	7.4	open	close	2.9	open	close	1.5
Put LIC-102 to 7.0 ft	10/20/95	1138	5.0	10.0	4.05	0	open	close	2.1	open	close	1.1
LIC-102 setpoint at 7.0 ft. Second pump left on TK-101	10/20/95	1339 p 5.2 ft	7.0	10.1	5.1	12.8	open	close	6.2	open	close	3.7
LIC-102 setpoint did get high pressure filler alarm at 1352.	10/20/95	1500	7.1	10.1	3.97	14	open	close	5.5	open	close	4.0
Started into Cascade w/ little water present.	10/23/95	0911	4.0	8.0	3.4-3.7	0	open	close	0.3	open	close	0.3
Increased LIC-102 set point to 5.0	10/23/95	1015	4.6	7.6	4.18	0	open	close	2.8	open	close	1.0
Increased LIC-102 set point to 6.0 *	10/23/95	1046	4.94	7.8	4.01	0	open	close	0.98	open	close	0.5

\* Set FIC-2 into manual and 0% output. It come open when FIC-1 closed below 0 gpm.

OTP APPROVAL  
DESIGNATOR Q

PPF LOW LEVEL WASTEWATER  
TREATMENT FACILITY (PROCESS)

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BASELINE PERFORMANCE DATA SHEET  
(DATA SHEET 2)

CONTROL SCHEME/ COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	Filter OPEN		PDI-202	Train OPEN		PIC-2
							F202A	F202B		1	2	
LIC-102 SP=6.0	10/23/95	1109	5.26	7.86	4.10	4.1	Open	Close	2.25	open	close	0.90
LIC-102 SP=6.0	10/23/95	1153	5.71	7.97	3.97	9.1	open	close	5.44	open	close	1.70
LIC-102 SP=6.5	10/23/95	1228	5.67	8.0	4.10	0	open	close	0.10	open	close	0.3
LIC-102 SP=6.5	10/23/95	1311	6.26	8.12	4.01	6.89	Open	close	4.3	open	close	1.2
LIC-102 SP=7.0	10/23/95	1313	6.27	8.01	4.04	1.3	open	close	0.67	open	close	0.4
LIC-102 SP=7.0	10/23/95	1332	6.50	7.95	4.06	3.08	open	close	2.34	open	close	0.8
LIC-102 SP=7.5	10/23/95	1338	6.60	8.21	3.98	0	open	close	0.11	open	close	0.3
LIC-102 SP=7.5	10/23/95	1410	7.26	8.24	3.98	10.1	open	close	6.38	open	close	2.4
LIC-102 SP=9.0	10/23/95	1416	7.10	7.86	4.09	0	open	close	0.14	open	close	0.3

August 1, 1995

9:37am

**BASELINE PERFORMANCE DATA SHEET**  
(DATA SHEET 2)

CONTROL SCHEME/ COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	Filter OPEN		POI-202	Train OPEN		PIC-2
							F202A	F202B		1	2	
LIC-102 SP=9.0	10/23/95	1428	7.45	7.73	3.98	0.6	open	close	0.6	open	close	0.40
LIC-102 SP=9.0	10/23/95	1443	7.93	8.13	4.00	2.3	open	close	1.3	open	close	0.54
LIC-102 SP=6.8	10/24/95	0740	6.86	11.7	4.11	0	open	close	1.0	open	close	0.36
LIC-102 SP=6.8 Second filter opened due to dP alarm on F202A	10/24/95	0836	7.49	12.0	3.92	17.2	open	open	1.99	open	close	5.93
LIC-102 SP=6.0 PIC-2 alarm at 11 psig, PIC=27gpm after setpoint change	10/24/95	0901	7.05	11.3	4.05	20.4	open	open	3.6	open	close	6.2
LIC-102 SP=5.0 TK-101 level went to 2.46 & P101B shut-off. LIC-102 sp set back to 6.0	10/24/95	0934	6.6	11.0	3.88	34	open	open	~	open	open	9.0
LIC-102 SP=5.5 FIC-102 SP=20 gpm	10/24/95	1049	6.4	20.2	4.70	20.2	open	open	2.3	open	close	8.2
"	10/24/95	1132	5.7	20.3	4.35	13.3	open	close	7.9	open	close	3.5
"	10/24/95	1145	5.78	20.3	4.78	15.0	open	open	1.7	open	close	5.0



OTP APPROVAL  
DESIGNATOR Q

PPF LOW LEVEL WASTEWATER  
TREATMENT FACILITY (PROCESS)

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BASELINE PERFORMANCE DATA SHEET  
(DATA SHEET 2)

CONTROL SCHEME/ COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	Filter OPEN		PDI-202	Train OPEN		PIC-2
							F202A	F202B		1	2	
LIC-102 SP=5.5 FIC-102 SP=12.0	10/24/95	1307	5.58	11.76	4.05	13.93	op	op	1.5	op	cl	3.8
	10/24/95	1326	5.35	7.0	3.87	10.7	op	op	1.5	op	cl	2.7
LIC-102 SP=6.95 FIC-102 SP=12.0	10/25/95	0818	6.95	11.9	4.09	9.5	op	cl	7.5	op	cl	2.3
	10/25/95	0928	6.95	12.4	4.10	10.2	op	op	1.2	op	cl	2.3
LIC-102 SP=6.96 FIC-102 SP=12.0 LIC-101 SP=4.0	10/25/95	1308	6.93	11.86	4.15	10.3	op	op	1.3	op	cl	2.4
LIC-102 SP=6.0 FIC-102 SP=12.0 LIC-101 SP=4.0	10/25/95	1338	6.61	12.5	3.4	23.6	op	op	4.0	op	op	5.5
"	10/25/95	1348	6.25	12.2	3.30	18.9	op	op	3.0	op	op	3.8
	10/25/95	135A	6.02	12.1	3.32	15.3	op	op	2.23	op	op	2.7
	10/25/95	1441										

**BASELINE PERFORMANCE DATA SHEET**  
(DATA SHEET 2)

CONTROL SCHEME/ COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	Filter OPEN		PDI-202	Train OPEN		PIC-2
							F202A	F202B		1	2	
LIC-102 SP=6.4 FIC-102 SP=12.0 LIC-101 SP=4.0	10/28/95	0813	6.38	12.1	4.01	10.6	cl	op	2.1	op	cl	2.6
PID1A turned on to see impact of both pumps system stable w/ both pumps	10/29/95	1303	6.5	12.1	4.01	13.4	cl	op	2.7	op	cl	3.9
LIC-102 SP=5.64 FIC-102 SP=9.77 LIC-101 SP=4.0	10/31/95	0801	5.5	10.0	4.01	7.8	cl	op	5.2	op	cl	1.6
"	10/31/95	1244	5.9	9.7	4.0	12.7	cl	op	6.8	op	cl	4.2
System stable, test terminated at 1452												
LIC-102 SP=4.6 FIC-102 SP=9.5 LIC-101 SP=4.0	11/1/95	0812	4.75	9.7	4.02	11.5	cl	op	7.9	op	cl	3.2
"	11/1/95	1414	4.6	9.5	4.09	10.1	cl	op	5.8	op	cl	2.3
LIC-102 SP=5.4 FIC-102 SP=12.1 LIC-101 SP=4.0	11/6/95	0917	5.4	12.1	4.10	10.0	op	cl	1.7	op	cl	2.5

OTP APPROVAL  
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PEP LOW LEVEL WASTEWATER  
TREATMENT FACILITY (PROCESS)

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PARAMETER VARIATION DATA SHEET  
(DATA SHEET 3)

CONTROL SCHEME/COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	PDI-202	PIC-2
Set point for LIC-102 at 5.0 actual tank level 5.1 - running stable	10/20	10:22	5 ft	10.1	3.98	11.5	4.6	2.8
Setpoint at 7.0 for LIC-102 has been @ 1.5 hrs and has not made it to 7.0 ft.	10/20	13:04	7 ft 10.3w MLW 10:25	9.97	4.05	5.8	2.5	0.9
			9 ft					
				5 gpm				
				10 gpm				
				20 gpm				
					3.8 ft			
					4.2 ft			
					4.5 ft			

MLW  
MLW

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DESIGNATOR Q

PFP LOW LEVEL WASTEWATER  
TREATMENT FACILITY (PROCESS)

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PARAMETER VARIATION DATA SHEET  
(DATA SHEET 3)

CONTROL SCHEME/COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	PDI-202	PIC-2	
System Stable at LIC-102 SP=5.0	10/29/95	1039	5 ft	7.8	4.0	5.3	2.7	1.0	KB
System Stable at LIC-102 SP=7.5 Low Reset on LIC-102 forcing PB (Gain) offset.	10/29/95	1347	7 ft (6.9)	8.2	4.04	6.0	4.3	1.2	KB
System Stable at LIC-102 SP=9.0 Low Reset on LIC-102 forcing offset	10/29/95	1451	9 ft (7.8)	7.9	4.01	0	0.7	0.4	KB
				5 gpm					
				10 gpm					
				20 gpm					
						3.8 ft			
						4.2 ft			
						4.5 ft			

Test stopped

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PPF LOW LEVEL WASTEWATER  
TREATMENT FACILITY (PROCESS)

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PARAMETER VARIATION DATA SHEET  
(DATA SHEET 3)

CONTROL SCHEME/COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	PDI-202	PIC-2
			5 ft					
			7 ft					
			9 ft					
				5 gpm				
Increase FIC-102 from 12 gpm to 20 gpm Lic-102 SP = 6.0. Dropped Lic-102 SP to 5.5 because of the offset & TK-101 up to 4.95 ft. <sup>@ 1055</sup> Set point on FIC-102	10/24/95	1024	6.4	12 gpm	4.1	9.9	7.5	2.1
put back to 12 gpm. TK-101 never able to stabilize. @ 1145				20 gpm				
					3.8 ft			
					4.2 ft			
					4.5 ft			

August 8, 1995

7:46am

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DESIGNATOR Q

PFP LOW LEVEL WASTEWATER  
TREATMENT FACILITY (PROCESS)

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PARAMETER VARIATION DATA SHEET  
(DATA SHEET 3)

CONTROL SCHEME/COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	PDI-202	PIC-2
			5 ft					
			7 ft					
			9 ft					
Test terminated at 1420, system stable	10/24/95	1402	5.58	7 gpm	3.92	15.7	1.2	5.2
Decrease FIC-102 from 12gpm to 7gpm	10/29/95	1316	5.48 <del>3.97</del>	12 <del>10</del> gpm	3.97	15	1.8	4.7
				20 gpm				
					3.8 ft			
					4.2 ft			
					4.5 ft			

August 8, 1995

7:46am

OTP APPROVAL  
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PFP LOW LEVEL WASTEWATER  
TREATMENT FACILITY (PROCESS)

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REV-0 <sup>688</sup>  
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PARAMETER VARIATION DATA SHEET  
(DATA SHEET 3)

CONTROL SCHEME/COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	PDI-202	PIC-2
			5 ft					
			7 ft					
			9 ft					
				5 gpm				
				10 gpm				
				20 gpm				
SP on LIC-101 changed to 3.0 @ 1041 System stable at 1307	10/6/95	1145	6.8	12.0	3.8 ft	8.7	1.2	1.8
LIC-102 SP=6.95 FIC-102 SP=12.0 Increased LIC-101 to 4.2 @ 0933 Set point change responded well. @ 1037	10/6/95	1037	6.83	11.7	4.2 ft	8.1	1.04	1.6
					4.5 ft			

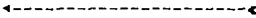
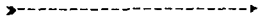
August 8, 1995

7:46am

OTP APPROVAL DESIGNATOR Q	PFP LOW LEVEL WASTEWATER TREATMENT FACILITY (PROCESS)	WHC-SD-CP-OTR-154 REV-0 660 PAGE <del>13</del> OF <del>14</del> 38 of 39
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**PARAMETER VARIATION DATA SHEET**  
 (DATA SHEET 3)

CONTROL SCHEME/COMMENTS	DATE	TIME	LIC-102	FIC-102	LIC-101	FIC-1	PDI-202	PIC-2
System responded LIC-101 dropped down to 3.2 ft before going back to 9.0 ft. Flowrate in FIC-1 went as high as 299 gpm.	10/25/95	1447	8 ft	12.3	4.0	12.1	1.7	1.9
Dropped LIC-102 SP to 6.0 ft. PIC-2 did not limit FIC-1 opening to	10/25/95	1322	7 ft	11.5	3.8	29.8	5.5	8.0
Keep pressure below 10 psig			9 ft					
				5 gpm				
				10 gpm				
				20 gpm				
					3.8 ft			
					4.2 ft			
					4.5 ft			





**UPSET CONDITION DATA SHEET**  
(DATA SHEET 4)

**PUMPING 291-Z SUMP** 11/6/85

Initial Conditions @ 1040	Off-normal Conditions during Test @ 1052	2110
LIC-101: 4.0	5.0	4.00
LI-101: 4.1	4.0	3.88
LIC-102: 6.0	6.00	6.00
LI-102: 6.0	6.26	6.71
FIC-1: 10.0	13 gpm	9.6
FIC-102: 10.0	10 gpm	10.2

Problems:

Comments: 291-2 Pump in AUTO. SK-101 never above 5.0 ft

**PUMP FAILURE** 11/6/85

Initial Conditions:	Off-normal Conditions during Test
LIC-101: 4.0	_____
LI-101: 4.01	_____
LIC-102: 5.39	_____
LI-102: 5.2	_____
FIC-1: 7.8	_____
FIC-102: 15 gpm in manual mode 12 auto	_____

FIC-1 output went to 100% & valve stays open even though LIC PV was dropping. Took system out of cascade prior to high TK-101 high level at 5 ft.

Problems: FIC-1 out never left 100% open. Possible to water hammer inlet pipe.

Comments: Turning p1013 off at WCON not actual simulation of pump failure.

**PUMPING 291-Z SUMP WITH FCV-3 IN MANUAL**

Initial Conditions:	Off-normal Conditions during Test
LIC-101: _____	_____
LI-101: _____	_____
LIC-102: _____	_____
LI-102: _____	_____
FIC-1: _____	_____
FIC-102: _____	_____

Problems:

Comments:

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July 25, 1995

1:03pm

## DISTRIBUTION SHEET

To Distribution	From Greg Bergquist	Page 1 of 1
		Date 3/25/96

Project Title/Work Order Low Level Wastewater Treatment Facility Process Control Operational Test Report, WHC-SD-CP-OTR-154, K6012	EDT No. 609900
ECN No. N/A	

Name	MSI N	Text With All Attac h.	Text Only	Attach. / Append ix Only	EDT/E CN Only
------	----------	------------------------------------	--------------	--------------------------------------	---------------------

G. G. Bergquist (2)	T5-55	x			
L. T. Cunningham	T5-55	x			
G. A. Funston	T5-55	x			
M. W. Gibson	T5-55	x			
E. E. Icyan	T4-20	x			
C. M. Kronvall	T5-15	x			
G. R. Silvan	T4-20	x			
M. D. Talbot	T5-15	x			
M. L. Winstead	T5-55	x			
Central Files					

~~15-07~~ x A3-88