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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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1	1	Pres. MGE	[Signature]	1/13/97	T4-52						
1	1	Design Authority: TL Watson	[Signature]	1/13/97	T4-02						
1	1	Proj. Engr.: JB Payne	[Signature]	1/13/97	T4-02						
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W-026, Acceptance Test Report Imaging Passive/Active Neutron (IPAN) (Submittal # 54.3 - C3)

TL Watson
Fluor Daniel Northwest, Richland, WA 99352-1050
U.S. Department of Energy Contract DE-AC06-87RL10930

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Abstract: In the Spring of 1996, Site Acceptance Tests were performed for the 2 Imaging Passive/Active Neutron (IPAN) assay systems installed in the WRAP 1 Facility. This report includes the test documentation and the completed test checklists, with comments and resolutions. All testing was completed, with comments resolved by August 1996.

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Test Plan Document

Site Control Tests KEH/CT 001

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SYSTEM
A

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WRAP-1 IPAN Site Acceptance Test Plan for Control

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Revision/Review History

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Test Plan Document

Site Control Tests KEH/CT 001
Issue Date 3/27/96 Revision (0)CHANGE CONTROL LOG**DRAFT VERSION (3/29/96)****General:**

Change document header to "Site Control Tests" and document title to "Site Acceptance Test Plan for Control.

Add appendices list to Table of Contents.

Change references from "facility" to "Site."

Minor changes in punctuation and sentence structure.

Commenet specific changes:

MEP-1) Remove communication operations from manual operations test sheets in appendix A1.1.

MEP-2) Add test in Sequence 1.1 on A2.1.3 for "Abort Assay."

MEP-3) Delete "Prepare to receive database" and add failure mode operation for database accuracy check in A2.1.5.

MEP-4) Add "Drum presence sensed; conveyor stopped" operation to sequence 2.1 on A2.1.6.

MEP-5) Add "Assay in Progress" to sequence 3 on A2.1.8.

MEP-6) Change sequence 3.1 to reflect "Criticality Alert" as a failure mode.

MEP-8) Change Sequence 4 to read "start conveyor" rather than "conveyor started."

MEP-9) Add message "Available for next task" to end of Sequence 5.

MEP-10) Delete "Package in position to monitor." This is an internal IPAN status.

VWV-5) Add appropriate text to Section 2.3.1.

Other changes:

Delete "fail to turn on" and "fail to turn off" error messages from 3.1.1.3.

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1. Test Objective

The objective of the WRAP-I Imaging Passive/Active Neutron Measurement System (IPAN) site acceptance test plan (ATP) for Control is to demonstrate to the customer the satisfactory performance of the IPAN control system after delivery and setup at the Hanford WRAP Facility.

Satisfactory performance will be achieved by meeting or exceeding the specifications as put forth in the following documentation:

- System Definition Document (KH5369 SDD/001)
- Sequence and Interlock Document (KH5369 SID/001)
- User Required Specifications (Specification No. UE&C Project 6237.007 Section 13538)
- PSC/KEH Correspondence files for IPAN project (reference contract KH5369)

To demonstrate this performance, the ATP for Control is designed to thoroughly test control system components that were identified by reservation in the factory tests as either not tested or as failing factory testing, and to retest an identified portion of system components in the same manner as the factory acceptance tests. The format of the ATP for Control is the same as the factory test plan and is intended to test basic components and associated subcycles, then to retest those components as they are integrated into upper level assemblies and operations. The final level of control testing is a complete integrated automated cycle, including barrel transfers between the Automatic Guided Vehicle (AGV), Transfer Conveyor (TC), IPAN, and all required network communications via the Plant Control System (PCS) and Systems Interface Equipment (SIE).

Testing at the IPAN component level will include testing of elementary mechanical operations that form the basis for all IPAN cycle operations. Testing at the system level will include testing of elementary mechanical operations as integrated into a complete, integrated control cycle. Interlock failures and error reporting associated with these operations are included in the test plan.

2. Test Description

2.1 System Description

The WRAP-I IPAN is designed to assay 55 gallon drums or 85 gallon drums. Two modes of operation are Normal (automatic) Mode and Manual (maintenance) Mode. The normal mode of operation allows the system to be controlled completely by a WRAP-I supervisor computer and will require minimal operator interaction. The Manual Mode will allow the operator to control all system mechanical and measurement functions using the IPAN computer and/or a local control panel.

Normal Mode

In Normal Mode operation, the IPAN System receives a drum from the main conveyor system after a PCS request. Once the barrel transfer is complete, the IPAN system begins a measurement cycle which includes a sequence of 16 measurements, or grabs. After the measurement cycle is complete and the correct PCS request is made, the IPAN returns the drum to the main conveyor system.

A complete IPAN control cycle is summarized in the following system operations:

1. The door for the system is opened (if not already open).

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2. The drum is loaded onto the IPAN feeder conveyor section, is centered and stops inside the cavity on the IPAN turntable.
3. The door is closed.
4. A Passive Neutron Measurement is performed. Raw grab data is acquired for each 22.5 degree rotation. This process continues until the drum has been rotated 360 degrees for a total of 16 grabs.
5. An Active Neutron Measurement is performed. Raw grab data is acquired for each 22.5 degree rotation. This process continues until the drum has been rotated 360 degrees for a total of 16 grabs.
6. The system door opens
7. The drum is unloaded from the IPAN conveyor.

Manual Mode

In Manual Mode, all individual operations for a complete cycle can be performed by the operator either at the IPAN computer or the Local Control Panel. This mode can be used for system maintenance or for manual assay operations.

2.1.1 Component Description

The components and operations can be divided into the following two categories, Control and Measurement. Control components and operations are responsible for communications between the components and all operations required for manipulation of the drums. Measurement components and operations are responsible for the raw data acquisition and neutron generator operations which are required for each measurement.

Control Components

The following list contains the primary upper level assemblies required for control of the IPAN system.

1. IPAN Conveyors
 - Turntable Section
 - Cavity Feed Section
2. IPAN Measurement Cavity and Door
3. IPAN Local Control Box
4. Control Cabinet

Measurement Components

The following list contains the primary components required for measurements from the IPAN system. A complete list can be found in the System Definition Document.

1. Detectors and Analog Data Acquisition Electronics
 - ^3He Detectors
 - PSC 230 four channel amplifier/discriminators
2. IPAN Electronics Rack (Digital Electronics)
 - PSC 220 32 Channel Amplifier Controller
 - PSC CG clock generator
 - LeCroy 2323A Programmable Gate Generator
 - LeCroy 4434 32 Channel Scalar
 - LeCroy 2551 12 Channel Scalar
 - LeCroy 429A Fan in/Fan out
 - Joerger Data Way Display
 - Kinetic Systems 1502 CAMAC CRATE
 - Kinetic Systems 3922 Crate Controller
 - Kinetic Systems 2927 Z1A PC interface board
3. IPAN Computer Rack (Neutron Generator Control)
 - PSC 199 Neutron Generator Controller

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- PSC 198 Pulse Forming Network (PFN)
- PSC TTA (Neutron Generator Tube and Transformer Assembly)
- Sorensen DCS 600-1.7 600VDC power supplies
- Oscilloscope
- Hewlett Packard Laserjet 4 Printer
- IBM 486 Equivalent Computer and Monitor

2.1.2 Component Integration

The components are integrated to provide the necessary control and measurement required for a complete Active Neutron Measurement cycle. This measurement cycle is further integrated into the WRAP-1 system which controls and performs all measurement processes. The following diagram shows the logical interconnection of all components of the system.

2.2 Test Setup and Descriptions

Upon delivery, site installation and initial testing, the IPAN system will be considered ready for the ATP for Control. The tests will involve inspection of the system, associated documentation, and control tests.

Three groups of tests will be performed in an order which integrates previous tests and results into the current test. Each operation and the components associated with that operation will be tested re-tested as integrated into a complete measurement cycle. The scope of this plan is for tests associated only with IPAN control.

1. Inspection and verification of the system components
 - Verifies which individual components of the system are being tested and operation requirements of the system.
2. Control tests
 - Tests control function, interlock and operations of components using test matrices. These are tests of individual (Manual Maintenance mode) and integrated (normal mode) operations required for a complete IPAN cycle.

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Testing can begin upon mutual approval of the test plan by the customer and PSC and will be performed according to the following guidelines:

- Testing will be suspended if mutually agreed by the customer and PSC that the system is completely inoperable and will resume when agreed that the system is operable with respect to the test being performed.
- Test results will be documented by the customer in the appropriate test sheet in a working copy of the test log and will be verified by the customer and PSC. Comments on operations will be included in the data log either in the space provided for comments or as an addition to the test log. In the event of test failure the cause will be remedied and the test will be performed again or an exception will be agreed upon.
- Test failures and exceptions will be noted in the comments section of the test sheets. Upon completion of the testing, a final list of exceptions and outstanding actions for acceptance will be generated from the comments.
- For safety purposes, all testing of interlocks will be demonstrated by PSC personnel. Barriers and appropriate radiometric measurement instrumentation will be provided for all testing to insure that all test personnel maintain a safe operating distance from the equipment.

2.2.1 IPAN system inspection and verification

Inspection and verification of all components of the system will be done to clearly define the equipment being tested as described in the System Definition Document. The following steps (performed after all measurement tests are completed) will confirm the equipment tested.

1. Physical Verification:
 - All components will be verified by part number, serial number, system integration as described by assembly drawings, and conformance to all specifications. (Specifications include wiring labels, wiring terminations, paint, etc.)
2. Documentation
 - All documentation will be reviewed to insure an accurate representation of components and their integration into the system is made.

2.2.2 Control tests

The scope of these tests is to verify correct function of all sequences of control required to move a drum into the IPAN system and perform a complete cycle. All sequences of control will be tested individually to perform a complete cycle of control. This is accomplished in Manual Maintenance mode using available commands at the local control panel and IPAN computer. The following is a list of control tests:

1. Mechanical functions required for a complete IPAN cycle.
2. Communications functions required for a complete IPAN cycle.
3. Manual Maintenance Mode Tests.

During testing of Software Reported Errors (reference Appendix A 4.1), errors will be generated by actuation of existing switches when practical. Where switches are not available or inaccessible, errors will be simulated by providing a 24 volt input to the appropriate input module.

Detailed control procedures and test sheets can be found in Appendices A1.1 and A2.1.

2.3 Network Communications

2.3.1 SIE Communications

During normal operation mode the WRAP-1 SIE will communicate with the IPAN PC via an Ethernet network connection. The IPAN must demonstrate all defined communications with the SIE (reference Appendix A 2.1).

2.3.2 PCS Communications

During normal operation mode the WRAP-1 PCS will communicate with the IPAN PC via an Ethernet network connection. The IPAN must demonstrate all defined communications with the PCS (reference Appendix A 2.1).

2.4 Matrix Drums

55 and 85 gallon matrix drums are required to evaluate control performance with respect to desired drum type and capacity load of the system (approximate 2000 lb.). For convenience, the majority of the tests will be performed using one size of drum.

3. Control Sequences and Operations Description

3.1 Manual Mode Tests

The scope of these tests is to demonstrate proper function of all required operations available in Manual Mode. System operations will be demonstrated using the functions available at the local control panel. Manual Maintenance operations will be demonstrated according to specific procedure.

3.1.1 Mechanical Operations

Verification of the following elementary mechanical operations will be accomplished by performing the specific operation and verifying the associated interlocks and indications.

The following means of verification will be used and documented:

1. Verify operation by viewing associated component function of the system.
2. Verify failure modes using failure conditions.
3. Verify indications by viewing associated lights and beacons.

Verification will be accomplished according to procedure and documented on the associated test sheets found in Appendix A 1.1.

3.1.1.1 Local control panel mechanical operations

The objective of these tests is to verify that the elementary operations are functional and can be controlled in Manual Mode. These operations form the basis of all IPAN operations. These tests demonstrate the procedure for testing in detail all IPAN cycle operations. These basic operations are described in more detail on the test sheets found in Appendix A1.1. The following operations will be performed at the local control panel and the IPAN computer in diagnostics mode:

1. Align drum prior to entry into the cavity.
 - Guide mechanism is actuated.
2. Load drum into IPAN from the main conveyor using Load Conveyors Switch. Indication light at local control will illuminate.

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- Conveyors will energize and move drum to the stop switch at the turntable. Indication light at local control panel will turn off.
- 3. Rotate turntable and align turntable.
 - Turntable will rotate and align.
- 4. Close door using Close Door switch. Indication light at local control illuminates.
 - Door will move to Door Closed stop switch. Indication light at local control will turn off.
 - Failure modes:
 - Obstruction of door actuates safety switch causing system fail.
 - Over travel of door past Door closed switch causes system fault.
 - Reset system after failure using PLC Reset Switch.
- 5. Open door using Open Door switch. Indication light at local control illuminates.
 - Door will move to Door Open stop switch. Indication light will turn off.
 - Failure modes:
 - Over travel of door past door open stop switch causes system failure.
 - Reset system after failure using PLC Reset Switch.
- 6. Unload drum from IPAN cavity to main conveyor using Unload Conveyors switch. Indication light at local control panel illuminates.
 - Conveyor energize and move drum to the main conveyor. Indication light at local control panel turns off.

3.1.1.2 Software Menu Item Checklist

Command items of the software will be exercised and verified. These commands are repeated throughout subsequent testing.

Verification of each operation will be documented on the Software Menu item check list found in Appendix 3.1.

3.1.1.3 Software Reported Errors and Messages

Software reported errors are generated for appropriate system failures. These messages can be verified during the corresponding failure tests. A resulting "Drum NDA Instrument Fault; Assay Aborted" message is transmitted to the WRAP-1 PCS if any of these conditions are present.

1. "Emergency Stop"
2. "Drum In Overtravel"
3. "Door Open Overtravel"
4. "Door Close Overtravel"
5. "Door Safety Switch"
6. "Door Detectors In Overtravel"
7. "Door Detectors Out Overtravel"
8. "MA Not In Position"
9. "Roller Motor Fail"
10. "Detector Actuator Failed"
11. "Door Motor Fail"
12. "Door Motion Timeout"
13. "Detector Motion Timeout"
14. "Aligner Motion Timeout"
15. "Load / Unload Timeout"
16. "Unknown Position"

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3.2 Normal Mode

The scope of these tests is to demonstrate proper function of required operations as integrated into a complete IPAN cycle in automatic mode. All operations will be demonstrated in the normal mode using SIE and PCS communication.

The following are required inputs, outputs, and results for a complete IPAN assay cycle.

1. Initiation functions
 - Communications between IPAN PC and WRAP-1 SIE and WRAP-1 PCS
2. Interlock functions
3. Indication functions
4. Operation

All mechanical functions and sequences integrated into a complete IPAN cycle will be tested, including fault modes. Communication between the IPAN, SIE and PCS is required for normal mode tests. Messages reported to the IPAN, SIE and PCS can be printed and verified where feasible. Refer to the SIE and PCS interface and protocol documents for a complete description of the communications required.

There are two parts to this test:

1. Perform a complete IPAN automated cycle. The requirements for this include the integration of all IPAN, PCS and SIE communications for a cycle and verify they are supplied.
2. Perform a complete assay cycle and evaluate the failure modes during the IPAN cycle.

Verification and documented on the associated test sheets will be accomplished according to procedure in Appendix A 2.1.

The following is the standard sequence and associate steps for each sequence. Each of the steps will be tested.

3.2.1 Sequence 1 (Self Test)

3.2.1.1 Self test steps

1. Power on startup

3.2.2 Sequence 2 (Calibration Check and load IPAN)

3.2.2.1 Calibration check steps

1. Load IPAN
 - Drum to be received
 - Open door
 - Energize conveyor
 - Align and load drum to IPAN
 - Close door

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3.2.3 Sequence 3 (Perform assay)

3.2.3.1 Perform assay steps

1. Perform assay
2. Align turntable
3. Open IPAN door

3.2.4 Sequence 4 (Transfer drum from IPAN)

3.2.4.1 Transfer drum steps

1. Energize conveyor (unload)

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4. Appendices:

A1. CONTROL SEQUENCES AND OPERATIONS.....	
A1.1. ELEMENTARY OPERATIONS TEST PROCEDURE.....	
A 1.1.1 <i>Elementary Operations Test Sheets</i>	
A2.1. AUTOMATED OPERATIONS TEST PROCEDURE.....	
A 2.1.1 <i>Automated Operations Test Sheets</i>	
A3.1. SOFTWARE COMMAND/ ERRORS CHECKLISTS	
A4.1. SOFTWARE ERROR CHECKLIST.....	

Appendix A 1.1: Elementary Operations Test Procedure

1. Perform the operation described in the Title Block of the Test Sheet. The operation is performed as described under Manual Operation Title Block. (Note: manual operations will be performed from the local control panel)
2. Verify that the operation is performed as described in the Operation Block.
3. Indicate Pass or Fail
4. Provide comments on operation if applicable.
5. Sign as verified.
6. Perform the operation described in the Title Block of the Test Sheet. The operation is performed as described under Software Operation Title Block. (Note: software operations will be performed from the local control PC in the diagnostics mode.)
7. Verify that the operation is performed as described in the Operation Block.
8. Indicate Pass or Fail.
9. Provide comments on operation if applicable.
10. Sign as verified.

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

TEST SHEETS: ELEMENTARY OPERATIONS

Appendix A.1.1.1

Pajarito Scientific Corporation
Contract KH5369
Revision (0)

manatp.kch

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

Title	OPERATION
TRANSFER PACKAGE TO IPAN	<p>Set alignment mechanism to correct drum size. All IPAN conveyor motors energize (forward/loading).</p> <p>The drum is aligned and conveyed into the cavity.</p> <p>Warning Beacon Green until active assay.</p>

MANUAL OPERATION (Switch)	OPERATION COMMENTS
<p>Operations: ALIGN, LOAD</p> <p>PASS/FAIL</p>	
<p>Signed as Verified: </p> <p>Date: 6/13/96</p>	<p>Signed as Verified: _____</p> <p>Date: _____</p>

SOFTWARE OPERATION Diagnostics Command	OPERATION COMMENTS
<p>Operation: ALIGN, LOAD</p> <p>PASS/FAIL</p>	
<p>Signed as Verified: </p> <p>Date: 6/13/96</p>	<p>Signed as Verified: _____</p> <p>Date: _____</p>

Appendix A 1.1.2

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

Title		OPERATION
CLOSE DOOR		The IPAN door closes, overtravel switches and pinch point safety switches are enabled at all times. Conveyor motors are disabled when IPAN door is closed.
		Warning Beacon Green until active assay.
MANUAL OPERATION (Switch)		
Operation: CLOSE DOOR		
Signed as Verified:	Date: 6/13/96	Signed as Verified: Date:
SOFTWARE OPERATION Diagnostics Command		
Operation: CLOSE DOOR		
Signed as Verified:	Date: 6/13/96	Signed as Verified: Date:

Appendix A 1.1.3

Pajarito Scientific Corporation
Contract KH5369
Revision (0)

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WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

Title	OPERATION
PERFORM ASSAY	<p>IPAN performs assay. Align the turntable to HOME position.</p> <p>Warning Beacon Green until active assay. Warning Beacon Yellow prior to active assay. Warning Beacon Red during active assay.</p>

MANUAL OPERATION (Switch)	OPERATION COMMENTS
<p>Operation: PERFORM ASSAY</p> <p style="text-align: center;">N/A</p>	N/A
<p>Signed as Verified: </p>	<p>Date:</p>

SOFTWARE OPERATION Diagnostics Command	OPERATION COMMENTS
<p>Operation: PERFORM ASSAY</p> <p style="text-align: center;"> PASS/FAIL</p>	
<p>Signed as Verified: </p>	<p>Date: 6/13/96</p>

Appendix A 1.1.4

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

Title	OPERATION
OPEN DOOR	The IPAN door opens, overtravel switches and pinch point safety switches are enabled at all times. Warning Beacon Green.

MANUAL OPERATION (Switch)		OPERATION COMMENTS	
Operation: OPEN DOOR			
(PASS/FAIL)			
Signed as Verified:	Date:	Signed as Verified:	Date:
6/13/96		

SOFTWARE OPERATION Diagnostics Command		OPERATION COMMENTS	
Operation: OPEN DOOR			
(PASS/FAIL)			
Signed as Verified:	Date:	Signed as Verified:	Date:
6/13/96		

Appendix A 1.1.5

WRAP-1 IPAN Elementary Operations Test Sheet for Site ATP

Title	OPERATION
TRANSFER PACKAGE FROM IPAN	Retract aligners. IPAN conveyor motors energize in the unload direction(reverse). Package is transferred out of cavity. Warning Beacon Green.

MANUAL OPERATION (Switch)	OPERATION COMMENTS
Operation: RETRACT, UNLOAD <u>PASS/FAIL</u>	
Signed as Verified:	Date: 6/13/96
Signed as Verified:	Date:

SOFTWARE OPERATION Diagnostics Command	OPERATION COMMENTS
Operation: RETRACT, UNLOAD <u>PASS/FAIL</u>	
Signed as Verified:	Date: 6/13/96
Signed as Verified:	Date:

Appendix A 1.1.6

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

THIS SHEET INTENTIONALLY LEFT BLANK

Appendix A.1.1.7

Appendix A2.1: Automated Operations Test Procedure

1. Perform the operation described in the Title Block of the Test Sheet. The operation is performed as part of an automated assay in normal mode.
2. Verify that the operation is performed as described in the Operation Block.
3. Indicate Pass or Fail.
4. Provide comments on operation if applicable.
5. Sign as verified.
6. If a failure mode is available, simulate the failure during an automated assay and verify operation.
7. Indicate Pass or Fail.
8. Provide comments on operation if applicable.
9. Sign as verified.

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

TEST SHEETS: AUTOMATED OPERATIONS

Appendix A 2.1.1

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 1

Title	OPERATION
POWER ON STARTUP Check initial conditions of I/O on power up.	<u>INITIAL CONDITIONS</u> None <u>INITIATION</u> Sequence is initiated by power applied to system.

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 1			
PASS/FAIL			
Signed as Verified:	Date:	Signed as Verified:	Date:
6/17/96		

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 1			
PASS/FAIL		N/A	
Signed as Verified:	Date:	Signed as Verified:	Date:
N/A			

Appendix A 2.1.2

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 1.1

Title	OPERATION
Begin Automated assay	<p>INITIATION System Status can be requested at any time. Wait for "Request to Drop off Drum" PCS to IPAN.</p> <p><u>Failure Mode</u> General faults can occur at any time in the sequence causing "Drum NDA Instrument Fault" IPAN to PCS.</p> <p>SPECIAL INTERRUPT "Abort Assay" PCS to IPAN causes IPAN to discontinue assay sequence. IPAN returns, "Assay Aborted" status to PCS.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 1.1			
(PASS/FAIL)			
Signed as Verified:	Date:	Signed as Verified:	Date:
6/13/96		

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 1.1			
(PASS/FAIL)			
Signed as Verified:	Date:	Signed as Verified:	Date:
6/13/96		

Appendix A 2.1.3

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 2

Title	OPERATION
TRANSFER PACKAGE TO IPAN	<p>Open IPAN Door. Overtravel and safety switches are enabled at all times. "Door open" is set.</p> <p><u>INITIAL CONDITIONS</u></p> <ol style="list-style-type: none"> 1. IPAN in Normal mode. 2. No package present in the IPAN. 3. IPAN Door Open. <p><u>INITIATION</u> Sequence initiated by IPAN to PCS "Ready to Accept Drum."</p> <p><u>Failure Mode</u> "Transfer Failure, Stop Internal Conveyor" PCS to IPAN. Send "Drum NDA Instrument Fault " IPAN to PCS.</p> <p><u>COMPLETION</u> Send "Drum Presence Detected in Station" IPAN to PCS.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 2			
(PASS/FAIL)			
Signed as Verified:	Date: 6/13/96	Signed as Verified:	Date:

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 2			
PASS/FAIL		No fault message sent	
Signed as Verified:	Date: 6/17/96	Signed as Verified:	Date:

PASSED 8/22/96
 Appendix A 2.1.4

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 2.1

Title	OPERATION
TRANSFER DATABASE	<p>Receive Database from SIE.</p> <p><u>SPECIAL TEST</u> Check for database accuracy, verify valid drum size and status. Reference SIE interface definition document for allowed values.</p> <p><u>Failure Mode</u> Database information inaccurate. Send "Drum NDA Instrument Fault, Assay Aborted."</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 2.1		Unable to test w/o operational SIE. check during SIE ATP.	
PASS/FAIL Signed as Verified:
Date: 8/23/96		Signed as Verified:	Date: 6/17/96

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 2.1		N/A	
PASS/FAIL Signed as Verified:
Date: 8/23/96		Signed as Verified:	Date:

Appendix A 2.1.5

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 2.1

Title	OPERATION
Energize conveyors (forward)	<p>Set alignment mechanism to correct drum size. All IPAN conveyor motors energize (forward/loading). Output signal "Internal conveyor started for transfer" is set. The drum is conveyed into the cavity.</p> <p><u>FAILURE MODES</u> If the transfer fails, PCS sets "Transfer failure; stop internal conveyor." If drum overtravels the stop photoeye, switch S1 engages and motors stop and Send "Drum PAN fault; assay aborted."</p> <p><u>COMPLETION</u> "Send "Drum presence sensed; conveyor stopped" IPAN to PCS.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 2.2			
PASS/FAIL			
Signed as Verified:	Date:	Signed as Verified:	Date:
<i>G. E. Williams</i>	6/13/96		

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 2.2			
PASS/FAIL		No fault msg sent	
Signed as Verified:	Date:	Signed as Verified:	Date:
<i>G. E. Williams</i>	6/17/96		

PASSED 8/22/96
Appendix A 2-1.6

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 2.3

Title	OPERATION
Close door	<p>The IPAN door closes, overtravel switches and pinch point safety switches are enabled at all times. Conveyor motors are disabled when IPAN door is closed.</p> <p>Output signal "Door Closed" is energized.</p> <p>FAILURE MODE If obstruction gets in the path of the door closing, pressure switch S14 engages and door motor stops, reverses direction door opens and failure flag is set. Signal "System available for Monitoring" is deenergized. Send "Drum PAN failure; assay aborted" to PCS.</p> <p>"Package in Position for monitoring" energizes</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS	OPERATION COMMENTS	
Operation: SEQUENCE 2.3 <div style="border: 1px solid black; border-radius: 50%; padding: 2px; display: inline-block;">PASS/FAIL</div>		
Signed as Verified:	Date: 6/13/96	Signed as Verified: _____ Date: _____

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE	OPERATION COMMENTS	
Operation: SEQUENCE 2.3 <div style="border: 1px solid black; border-radius: 50%; padding: 2px; display: inline-block;">PASS/FAIL</div>	No fault msg sent	
Signed as Verified:	Date: 6/17/96	Signed as Verified: _____ Date: _____

Appendix A 2.1.7

PASSED

8/22/96

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 3

Title	OPERATION
PACKAGE MONITORING	<u>INITIAL CONDITIONS</u>
	1 IPAN in "unattended" mode.
	2 Drum present In the IPAN.
	<u>INITIATION</u>
	Sequence initiated by successful drum transfer.
	Send "Task in Progress," IPAN to PCS.

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 3			
<div>PASS/FAIL</div>			
Signed as Verified:	Date:	Signed as Verified:	Date:
6/13/86		

[Signature] 6/13/96

Signed as Verified: Date:

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 3		N/A	
PASS/FAIL			
Signed as Verified: N/A	Date:		

N/A

Signed as Verified: Date:

Appendix A 2.1.8

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 3.1

Title	OPERATION
Perform criticality check	<p>If criticality check is negative, proceed with assay.</p> <p><u>SPECIAL INTERRUPT</u> If criticality check is above allowable limit, send "Criticality Alert" to SIE. This interrupt is tested by lowering the upper limit in the IPAN software.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 3.1			
(PASS/FAIL)			
Signed as Verified:	Date:	Signed as Verified:	Date:
6/13/96		

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 3.1			
(PASS/FAIL)		N/A	
Signed as Verified:	Date:	Signed as Verified:	Date:
8/23/96		

"Criticality Alert" signal not tested -
 requires operational SIE. check
 during SIE ATP. 6/17/96

Appendix A 2.1.9

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 3.2

Title	OPERATION
Perform assay	1. IPAN sends "Request Strike Shape Validation Sequence" to PCS. 2. PCS sends "Ready to Observe Strike Shape" to IPAN. 3. IPAN begins sequence. 4. Operator observes waveform and responds "Strike Shape Good" or "Strike Shape Bad." 5. If "good" continue assay sequence. If "bad" abort assay and send "Drum PAN failure/Assay aborted" to PCS. Align the turntable to HOME position. Open door. Interlocks as described above.

AUTOMATIC OPERATION PERFORMANCE		OPERATION COMMENTS
NORMAL OPERATIONS		
Operation: SEQUENCE 3.2		
Signed as Verified:	Date: 6/13/96	Date:

AUTOMATIC OPERATION PERFORMANCE		OPERATION COMMENTS
FAILURE MODE		
Operation: SEQUENCE 3.2		
Signed as Verified:	Date: 6/17/96	Date:

PASSED 6/23/96 Appendix A 2.1.10

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 4

Title	OPERATION
TRANSFER PACKAGE FROM IPAN	<p>INITIAL CONDITIONS</p> <p>1. IPAN in Normal or Manual Mode. 2. Package present in the IPAN.</p> <p>INITIATION</p> <p>Sequence initiated by the mechanical handling control system setting signal "Ready to pick up drum from station; start conveyor."</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS	OPERATION COMMENTS
<p>Operation: SEQUENCE 4</p> <p style="text-align: center;">PASS/FAIL</p>	
<p>Signed as Verified: </p> <p>Date: 6/13/96</p>	<p>Signed as Verified:</p> <p>Date:</p>

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE	OPERATION COMMENTS
<p>Operation: SEQUENCE 4</p> <p style="text-align: center;">PASS/FAIL</p>	N/A
<p>Signed as Verified: N/A</p> <p>Date:</p>	<p>Signed as Verified:</p> <p>Date:</p>

Appendix A 2.1.11

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 5

Title	OPERATION
Unload package	<p>All IPAN conveyor motors energize in the unload direction (reverse). Package is transferred to the AGV. PCS sets signal "Drum out; Stop internal conveyor."</p> <p><u>FAILURE MODE</u> <i>If the transfer fails, PCS sets "Transfer failure; stop internal conveyor."</i></p> <p><u>COMPLETION</u> Output signal "Internal conveyor started for transfer" is deenergised. Output signal Task in Progress" is deenergised. Output signal "Available for Next Task" is energised.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 5 <div style="text-align: center;">(PASS/FAIL)</div>			
Signed as Verified:	Date: 6/13/96	Signed as Verified:	Date:

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 5 <div style="text-align: center;">(PASS/FAIL)</div>			
Signed as Verified:	Date: 6/13/96	Signed as Verified:	Date:

Appendix A 2.1.12

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

THIS SHEET INTENTIONALLY LEFT BLANK

Appendix A 2.1.13

Test Plan Document

Site Control Tests KEH/CT 001
Issue Date 3/27/96 Revision (0)

FILE MENU COMMAND	OPERATION COMMENTS	CHECKED
NEW		OK 6/17/96
OPEN		OK 6/17/96
CHOOSE RUN		
CONVERT RAW DATA		
SAVE		
SAVE AS		
PRINT		
PRINT PREVIEW		
PRINTER SETUP		
EXIT		
VIEW MENU COMMAND	OPERATION COMMENTS	CHECKED
TOOLBAR		OK 6/17/96
STATUS BAR		
CLEAR		
DATABASE INFO		
RUNTIME PARAMETERS		
SYSTEM STATUS		
PLC STATUS		
ACTIVE DATA		
PASSIVE DATA		
ACTIVE MATRICES		
PASSIVE MATRICES		
MULTIPLICITY REPORT		
RECONSTRUCTION DATA		
RECONSTRUCTION IMAGE		
FINAL REPORT		
ASSAY MENU COMMAND	OPERATION COMMENTS	CHECKED
LOCAL ASSAY MODE		OK 6/17/96
AUTOMATIC ASSAY MODE	SEE NOTE 1	
DIAGNOSTICS MENU COMMAND	OPERATION COMMENTS	CHECKED
CAMAC		OK 6/17/96
MODULES		
PLC		
STEPPER MOTOR		
ROTATE TABLE		
TCP/IP SERVER		
PCS CLIENT		
SIE CLIENT		
DATA ACQUISITION		
STOP ACQUISITION		
PARAMETERS MENU COMMAND	OPERATION COMMENTS	CHECKED
RUN TIME		OK 6/17/96
PULSES AND TIMES		
GATES AND TIMINGS		
HELP MENU COMMAND	OPERATION COMMENTS	CHECKED
INDEX		OK 6/17/96
USING HELP		
Signed as verified: (KEH)	Date: 6/17/96	Signed as Verified: (PSC)
		Date:

CONVERT
CURRENT
ASSAYCRITICALITY
CHECK

USER MENU

NOTE 1: AUTO ASSAY MODE IS NOT STOPPED BY "STOP ASSAY" (STOP SIGN) BUTTON ON TOOLBAR. PRESSING THIS BUTTON RESULTS IN A SYSTEM ERROR MESSAGE WHICH CAN ONLY BE CLEARED FROM THE SCREEN BY RESTARTING THE SOFTWARE. THE "STOP ASSAY" BUTTON SHOULD ABORT ANY ASSAY!! @

OK 8/23/96

Test Plan Document

Site Control Tests KEH/CT 001

Issue Date 3/27/96 Revision (0)

Appendix A4.1: Software Error Checklist

SOFTWARE ERROR CHECKLIST

Note: Where switches are available and readily accessible, errors will be generated by actuating these switches. When the errors must be simulated they will be simulated with an appropriate input signal to the PLC.

Software Reported Error	OPERATION COMMENTS	CHECKED
✓ "Emergency Stop"		② 6/17/96
✓ "Drum In Overtravel"		② 6/17/96
✓ "Door Open Overtravel"		② 6/17/96
✓ "Door Close Overtravel"		② 6/17/96
✓ "Door Safety Switch"		② 6/17/96
✓ "Door Detectors In Overtravel"		② 6/17/96
✓ "Door Detectors Out Overtravel"		② 6/17/96
✓ "Roller Motor Fail"		② 6/17/96
✓ "Detector Actuator Failed"		② 6/17/96
✓ "Door Motor Fail"		② 6/17/96
✓ "Door Motion Timeout"		② 6/17/96
✓ "Detector Motion Timeout"		② 6/17/96
✓ "Aligner Motion Timeout"		② 6/17/96
✓ "Load / Unload Timeout"		② 6/17/96
"Unknown Position"	Unable to duplicate	

Comments

check to see if "Unknown Position"
is required. If not, delete it.

Signed as verified: (KEH) <i>[Signature]</i>	Date: 6/17/96	Signed as verified: (PSC)	Date:
---	------------------	---------------------------	-------

Site Control Tests KEH/CT 001
Issue Date 3/27/96 Revision (0)

Test Plan Document

SYSTEM
B

Main Offices:
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WRAP-1 IPAN Site Acceptance Test Plan for Control

PSC Personnel	Name	Signature	Date
Prepared by:	Tom Peterson	<i>Tom Peterson</i>	6/6/96
Checked by:	Blaine Hadden	<i>Blaine Hadden</i>	6/7/96
Approved by:	Matthew R Newell	<i>Matthew R Newell</i>	6/7/96
Released by:	Tony Marlow	<i>Tony Marlow</i>	6/7/96

Revision Number	Accepted by KEH	Signature	Date (mm/dd/yy)

Revision/Review History

Revision Number	Reviewed by (PSC)	Comments	Date (mm/dd/yy)

ctrlatp.keh

Test Plan Document

Site Control Tests KEH/CT 001
Issue Date 3/27/96 Revision (0)CHANGE CONTROL LOG**DRAFT VERSION (3/29/96)****General:**

Change document header to "Site Control Tests" and document title to "Site Acceptance Test Plan for Control."

Add appendices list to Table of Contents.

Change references from "facility" to "Site."

Minor changes in punctuation and sentence structure.

Commenet specific changes:

MEP-1) Remove communication operations from manual operations test sheets in appendix A1.1.

MEP-2) Add test in Sequence 1.1 on A2.1.3 for "Abort Assay."

MEP-3) Delete "Prepare to receive database" and add failure mode operation for database accuracy check in A2.1.5.

MEP-4) Add "Drum presence sensed; conveyor stopped" operation to sequence 2.1 on A2.1.6.

MEP-5) Add "Assay in Progress" to sequence 3 on A2.1.8.

MEP-6) Change sequence 3.1 to reflect "Criticality Alert" as a failure mode.

MEP-8) Change Sequence 4 to read "start conveyor" rather than "conveyor started."

MEP-9) Add message "Available for next task" to end of Sequence 5.

MEP-10) Delete "Package in position to monitor." This is an internal IPAN status.

WWV-5) Add appropriate text to Section 2.3.1.

Other changes:

Delete "fail to turn on" and "fail to turn off" error messages from 3.1.1.3.

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1. Test Objective

The objective of the WRAP-1 Imaging Passive/Active Neutron Measurement System (IPAN) site acceptance test plan (ATP) for Control is to demonstrate to the customer the satisfactory performance of the IPAN control system after delivery and setup at the Hanford WRAP Facility.

Satisfactory performance will be achieved by meeting or exceeding the specifications as put forth in the following documentation:

System Definition Document (KH5369 SDD/001)
Sequence and Interlock Document (KH5369 SID/001)
User Required Specifications (Specification No. UE&C Project 6237.007 Section 13538)
PSC/KEH Correspondence files for IPAN project (reference contract KH5369)

To demonstrate this performance, the ATP for Control is designed to thoroughly test control system components that were identified by reservation in the factory tests as either not tested or as failing factory testing, and to retest an identified portion of system components in the same manner as the factory acceptance tests. The format of the ATP for Control is the same as the factory test plan and is intended to test basic components and associated subcycles, then to retest those components as they are integrated into upper level assemblies and operations. The final level of control testing is a complete integrated automated cycle, including barrel transfers between the Automatic Guided Vehicle (AGV), Transfer Conveyor (TC), IPAN, and all required network communications via the Plant Control System (PCS) and Systems Interface Equipment (SIE).

Testing at the IPAN component level will include testing of elementary mechanical operations that form the basis for all IPAN cycle operations. Testing at the system level will include testing of elementary mechanical operations as integrated into a complete, integrated control cycle. Interlock failures and error reporting associated with these operations are included in the test plan.

2. Test Description

2.1 System Description

The WRAP-1 IPAN is designed to assay 55 gallon drums or 85 gallon drums. Two modes of operation are Normal (automatic) Mode and Manual (maintenance) Mode. The normal mode of operation allows the system to be controlled completely by a WRAP-1 supervisor computer and will require minimal operator interaction. The Manual Mode will allow the operator to control all system mechanical and measurement functions using the IPAN computer and/or a local control panel.

Normal Mode

In Normal Mode operation, the IPAN System receives a drum from the main conveyor system after a PCS request. Once the barrel transfer is complete, the IPAN system begins a measurement cycle which includes a sequence of 16 measurements, or grabs. After the measurement cycle is complete and the correct PCS request is made, the IPAN returns the drum to the main conveyor system.

A complete IPAN control cycle is summarized in the following system operations:

1. The door for the system is opened (if not already open).

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2. The drum is loaded onto the IPAN feeder conveyor section, is centered and stops inside the cavity on the IPAN turntable.
3. The door is closed.
4. A Passive Neutron Measurement is performed. Raw grab data is acquired for each 22.5 degree rotation. This process continues until the drum has been rotated 360 degrees for a total of 16 grabs.
5. An Active Neutron Measurement is performed. Raw grab data is acquired for each 22.5 degree rotation. This process continues until the drum has been rotated 360 degrees for a total of 16 grabs.
6. The system door opens
7. The drum is unloaded from the IPAN conveyor.

Manual Mode

In Manual Mode, all individual operations for a complete cycle can be performed by the operator either at the IPAN computer or the Local Control Panel. This mode can be used for system maintenance or for manual assay operations.

2.1.1 Component Description

The components and operations can be divided into the following two categories, Control and Measurement. Control components and operations are responsible for communications between the components and all operations required for manipulation of the drums. Measurement components and operations are responsible for the raw data acquisition and neutron generator operations which are required for each measurement.

Control Components

The following list contains the primary upper level assemblies required for control of the IPAN system.

1. IPAN Conveyors
 - Turntable Section
 - Cavity Feed Section
2. IPAN Measurement Cavity and Door
3. IPAN Local Control Box
4. Control Cabinet

Measurement Components

The following list contains the primary components required for measurements from the IPAN system. A complete list can be found in the System Definition Document.

1. Detectors and Analog Data Acquisition Electronics
 - ^3He Detectors
 - PSC 230 four channel amplifier/discriminators
2. IPAN Electronics Rack (Digital Electronics)
 - PSC 220 32 Channel Amplifier Controller
 - PSC CG clock generator
 - LeCroy 2323A Programmable Gate Generator
 - LeCroy 4434 32 Channel Scalar
 - LeCroy 2551 12 Channel Scalar
 - LeCroy 429A Fan in/Fan out
 - Joerger Data Way Display
 - Kinetic Systems 1502 CAMAC CRATE
 - Kinetic Systems 3922 Crate Controller
 - Kinetic Systems 2927 Z1A PC interface board
3. IPAN Computer Rack (Neutron Generator Control)
 - PSC 199 Neutron Generator Controller

- PSC 198 Pulse Forming Network (PFN)
- PSC TTA (Neutron Generator Tube and Transformer Assembly)
- Sorensen DCS 600-1.7 600VDC power supplies
- Oscilloscope
- Hewlett Packard Laserjet 4 Printer
- IBM 486 Equivalent Computer and Monitor

2.1.2 Component Integration

The components are integrated to provide the necessary control and measurement required for a complete Active Neutron Measurement cycle. This measurement cycle is further integrated into the WRAP-1 system which controls and performs all measurement processes. The following diagram shows the logical interconnection of all components of the system.

2.2 Test Setup and Descriptions

Upon delivery, site installation and initial testing, the IPAN system will be considered ready for the ATP for Control. The tests will involve inspection of the system, associated documentation, and control tests.

Three groups of tests will be performed in an order which integrates previous tests and results into the current test. Each operation and the components associated with that operation will be tested re-tested as integrated into a complete measurement cycle. The scope of this plan is for tests associated only with IPAN control.

1. Inspection and verification of the system components
 - Verifies which individual components of the system are being tested and operation requirements of the system.
2. Control tests
 - Tests control function, interlock and operations of components using test matrices. These are tests of individual (Manual Maintenance mode) and integrated (normal mode) operations required for a complete IPAN cycle.

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Testing can begin upon mutual approval of the test plan by the customer and PSC and will be performed according to the following guidelines:

- Testing will be suspended if mutually agreed by the customer and PSC that the system is completely inoperable and will resume when agreed that the system is operable with respect to the test being performed.
- Test results will be documented by the customer in the appropriate test sheet in a working copy of the test log and will be verified by the customer and PSC. Comments on operations will be included in the data log either in the space provided for comments or as an addition to the test log. In the event of test failure the cause will be remedied and the test will be performed again or an exception will be agreed upon.
- Test failures and exceptions will be noted in the comments section of the test sheets. Upon completion of the testing, a final list of exceptions and outstanding actions for acceptance will be generated from the comments.
- For safety purposes, all testing of interlocks will be demonstrated by PSC personnel. Barriers and appropriate radiometric measurement instrumentation will be provided for all testing to insure that all test personnel maintain a safe operating distance from the equipment.

2.2.1 IPAN system inspection and verification

Inspection and verification of all components of the system will be done to clearly define the equipment being tested as described in the System Definition Document. The following steps (performed after all measurement tests are completed) will confirm the equipment tested.

1. Physical Verification:
 - All components will be verified by part number, serial number, system integration as described by assembly drawings, and conformance to all specifications. (Specifications include wiring labels, wiring terminations, paint, etc.)
2. Documentation
 - All documentation will be reviewed to insure an accurate representation of components and their integration into the system is made.

2.2.2 Control tests

The scope of these tests is to verify correct function of all sequences of control required to move a drum into the IPAN system and perform a complete cycle. All sequences of control will be tested individually to perform a complete cycle of control. This is accomplished in Manual Maintenance mode using available commands at the local control panel and IPAN computer. The following is a list of control tests:

1. Mechanical functions required for a complete IPAN cycle.
2. Communications functions required for a complete IPAN cycle.
3. Manual Maintenance Mode Tests.

During testing of Software Reported Errors (reference Appendix A 4.1), errors will be generated by actuation of existing switches when practical. Where switches are not available or inaccessible, errors will be simulated by providing a 24 volt input to the appropriate input module.

Detailed control procedures and test sheets can be found in Appendices A1.1 and A2.1.

2.3 Network Communications

2.3.1 SIE Communications

During normal operation mode the WRAP-1 SIE will communicate with the IPAN PC via an Ethernet network connection. The IPAN must demonstrate all defined communications with the SIE (reference Appendix A 2.1).

2.3.2 PCS Communications

During normal operation mode the WRAP-1 PCS will communicate with the IPAN PC via an Ethernet network connection. The IPAN must demonstrate all defined communications with the PCS (reference Appendix A 2.1).

2.4 Matrix Drums

55 and 85 gallon matrix drums are required to evaluate control performance with respect to desired drum type and capacity load of the system (approximate 2000 lb.). For convenience, the majority of the tests will be performed using one size of drum.

3. Control Sequences and Operations Description

3.1 Manual Mode Tests

The scope of these tests is to demonstrate proper function of all required operations available in Manual Mode. System operations will be demonstrated using the functions available at the local control panel. Manual Maintenance operations will be demonstrated according to specific procedure.

3.1.1 Mechanical Operations

Verification of the following elementary mechanical operations will be accomplished by performing the specific operation and verifying the associated interlocks and indications.

The following means of verification will be used and documented:

1. Verify operation by viewing associated component function of the system.
2. Verify failure modes using failure conditions.
3. Verify indications by viewing associated lights and beacons.

Verification will be accomplished according to procedure and documented on the associated test sheets found in Appendix A 1.1.

3.1.1.1 Local control panel mechanical operations

The objective of these tests is to verify that the elementary operations are functional and can be controlled in Manual Mode. These operations form the basis of all IPAN operations. These tests demonstrate the procedure for testing in detail all IPAN cycle operations. These basic operations are described in more detail on the test sheets found in Appendix A1.1. The following operations will be performed at the local control panel and the IPAN computer in diagnostics mode:

1. Align drum prior to entry into the cavity.
 - Guide mechanism is actuated.
2. Load drum into IPAN from the main conveyor using Load Conveyors Switch. Indication light at local control will illuminate.

Test Plan Document

Site Control Tests KEH/CT 001
Issue Date 3/27/96 Revision (0)

- Conveyors will energize and move drum to the stop switch at the turntable. Indication light at local control panel will turn off.
- 3. Rotate turntable and align turntable.
 - Turntable will rotate and align.
- 4. Close door using Close Door switch. Indication light at local control illuminates.
 - Door will move to Door Closed stop switch. Indication light at local control will turn off.
 - Failure modes:
 - Obstruction of door actuates safety switch causing system fail.
 - Over travel of door past Door closed switch causes system fault.
 - Reset system after failure using PLC Reset Switch.
- 5. Open door using Open Door switch. Indication light at local control illuminates.
 - Door will move to Door Open stop switch. Indication light will turn off.
 - Failure modes:
 - Over travel of door past door open stop switch causes system failure.
 - Reset system after failure using PLC Reset Switch.
- 6. Unload drum from IPAN cavity to main conveyor using Unload Conveyors switch. Indication light at local control panel illuminates.
 - Conveyor energize and move drum to the main conveyor. Indication light at local control panel turns off.

3.1.1.2 Software Menu Item Checklist

Command items of the software will be exercised and verified. These commands are repeated throughout subsequent testing.

Verification of each operation will be documented on the Software Menu item check list found in Appendix 3.1.

3.1.1.3 Software Reported Errors and Messages

Software reported errors are generated for appropriate system failures. These messages can be verified during the corresponding failure tests. A resulting "Drum NDA Instrument Fault; Assay Aborted" message is transmitted to the WRAP-1 PCS if any of these conditions are present.

1. "Emergency Stop"
2. "Drum In Overtravel"
3. "Door Open Overtravel"
4. "Door Close Overtravel"
5. "Door Safety Switch"
6. "Door Detectors In Overtravel"
7. "Door Detectors Out Overtravel"
8. "MA Not In Position"
9. "Roller Motor Fail"
10. "Detector Actuator Failed"
11. "Door Motor Fail"
12. "Door Motion Timeout"
13. "Detector Motion Timeout"
14. "Aligner Motion Timeout"
15. "Load / Unload Timeout"
16. "Unknown Position"

Test Plan Document

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3.2 Normal Mode

The scope of these tests is to demonstrate proper function of required operations as integrated into a complete IPAN cycle in automatic mode. All operations will be demonstrated in the normal mode using SIE and PCS communication.

The following are required inputs, outputs, and results for a complete IPAN assay cycle.

1. Initiation functions
 - Communications between IPAN PC and WRAP-1 SIE and WRAP-1 PCS
2. Interlock functions
3. Indication functions
4. Operation

All mechanical functions and sequences integrated into a complete IPAN cycle will be tested, including fault modes. Communication between the IPAN, SIE and PCS is required for normal mode tests. Messages reported to the IPAN, SIE and PCS can be printed and verified where feasible. Refer to the SIE and PCS interface and protocol documents for a complete description of the communications required.

There are two parts to this test:

1. Perform a complete IPAN automated cycle. The requirements for this include the integration of all IPAN, PCS and SIE communications for a cycle and verify they are supplied.
2. Perform a complete assay cycle and evaluate the failure modes during the IPAN cycle.

Verification and documented on the associated test sheets will be accomplished according to procedure in Appendix A 2.1.

The following is the standard sequence and associate steps for each sequence. Each of the steps will be tested.

3.2.1 Sequence 1 (Self Test)

3.2.1.1 Self test steps

1. Power on startup

3.2.2 Sequence 2 (Calibration Check and load IPAN)

3.2.2.1 Calibration check steps

1. Load IPAN
 - Drum to be received
 - Open door
 - Energize conveyor
 - Align and load drum to IPAN
 - Close door

Test Plan Document

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3.2.3 Sequence 3 (Perform assay)

3.2.3.1 *Perform assay steps*

1. Perform assay
2. Align turntable
3. Open IPAN door

3.2.4 Sequence 4 (Transfer drum from IPAN)

3.2.4.1 *Transfer drum steps*

1. Energize conveyor (unload)

Test Plan Document

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4. Appendices:

A1. CONTROL SEQUENCES AND OPERATIONS.....	
A1.1. ELEMENTARY OPERATIONS TEST PROCEDURE.....	
A 1.1.1 Elementary Operations Test Sheets.....	
A2.1. AUTOMATED OPERATIONS TEST PROCEDURE.....	
A 2.1.1 Automated Operations Test Sheets.....	
A3.1. SOFTWARE COMMAND/ ERRORS CHECKLISTS	
A4.1. SOFTWARE ERROR CHECKLIST.....	

Appendix A 1.1: Elementary Operations Test Procedure

1. Perform the operation described in the Title Block of the Test Sheet. The operation is performed as described under Manual Operation Title Block. (Note: manual operations will be performed from the local control panel)
2. Verify that the operation is performed as described in the Operation Block.
3. Indicate Pass or Fail
4. Provide comments on operation if applicable.
5. Sign as verified.
6. Perform the operation described in the Title Block of the Test Sheet. The operation is performed as described under Software Operation Title Block. (Note: software operations will be performed from the local control PC in the diagnostics mode.)
7. Verify that the operation is performed as described in the Operation Block.
8. Indicate Pass or Fail.
9. Provide comments on operation if applicable.
10. Sign as verified.

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site AYP

TEST SHEETS: ELEMENTARY OPERATIONS

Appendix A I.1.1

Pajarito Scientific Corporation
Contract KH5369
Revision (A)

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WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

Title	OPERATION
TRANSFER PACKAGE TO IPAN	<p>Set alignment mechanism to correct drum size. All IPAN conveyor motors energize (forward/loading).</p> <p>The drum is aligned and conveyed into the cavity.</p> <p>Warning Beacon Green until active assay.</p>

MANUAL OPERATION (Switch)	OPERATION COMMENTS
<p>Operations: ALIGN, LOAD</p> <p style="text-align: center;">(PASS/FAIL)</p>	
<p>Signed as Verified: </p> <p>Date: 6/13/96</p>	<p>Signed as Verified:</p> <p>Date:</p>

SOFTWARE OPERATION Diagnostics Command	OPERATION COMMENTS
<p>Operation: ALIGN, LOAD</p> <p style="text-align: center;">(PASS/FAIL)</p>	
<p>Signed as Verified: </p> <p>Date: 6/13/96</p>	<p>Signed as Verified:</p> <p>Date:</p>

Appendix A 1.1.2

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

Title	OPERATION
CLOSE DOOR	The IPAN door closes, overtravel switches and pinch point safety switches are enabled at all times. Conveyor motors are disabled when IPAN door is closed. Warning Beacon Green until active assay.

MANUAL OPERATION (Switch)		OPERATION COMMENTS	
Operation: CLOSE DOOR			
(PASS/FAIL)			
Signed as Verified:	Date: 6/13/96	Signed as Verified:	Date:

SOFTWARE OPERATION Diagnostics Command		OPERATION COMMENTS	
Operation: CLOSE DOOR			
(PASS/FAIL)			
Signed as Verified:	Date: 6/13/96	Signed as Verified:	Date:

Appendix A 1.1.3

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

Title	OPERATION
PERFORM ASSAY	<p>IPAN performs assay. Align the turntable to HOME position.</p> <p>Warning Beacon Green until active assay. Warning Beacon Yellow prior to active assay. Warning Beacon Red during active assay.</p>

MANUAL OPERATION (Switch)	OPERATION COMMENTS
<p>Operation: PERFORM ASSAY</p> <p style="text-align: center;">N/A</p>	N/A
Signed as Verified:	Date:

SOFTWARE OPERATION Diagnostics Command	OPERATION COMMENTS
<p>Operation: PERFORM ASSAY</p> <p style="text-align: center;">(PASS/FAIL)</p>	
Signed as Verified:	Date: 4/13/26

Appendix A 1.1.4

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

Title	OPERATION
OPEN DOOR	The IPAN door opens, overtravel switches and pinch point safety switches are enabled at all times. Warning Beacon Green.

MANUAL OPERATION (Switch)		OPERATION COMMENTS	
Operation: OPEN DOOR			
(PASS/FAIL)			
Signed as Verified:	Date:	Signed as Verified:	Date:
<i>[Signature]</i>	6/13/96		

SOFTWARE OPERATION Diagnostics Command		OPERATION COMMENTS	
Operation: OPEN DOOR			
(PASS/FAIL)			
Signed as Verified:	Date:	Signed as Verified:	Date:
<i>[Signature]</i>	6/13/96		

Appendix A 1.1.5

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

Title	OPERATION
TRANSFER PACKAGE FROM IPAN	Retract aligners. IPAN conveyor motors energize in the unload direction(reverse). Package is transferred out of cavity. Warning Beacon Green.

MANUAL OPERATION (Switch)		OPERATION COMMENTS	
Operation: RETRACT, UNLOAD			
<div style="border: 1px solid black; border-radius: 50%; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> PASS/FAIL </div>			
Signed as Verified:	Date:	Signed as Verified:	Date:
6/13/96		

SOFTWARE OPERATION Diagnostics Command		OPERATION COMMENTS	
Operation: RETRACT, UNLOAD			
<div style="border: 1px solid black; border-radius: 50%; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> PASS/FAIL </div>			
Signed as Verified:	Date:	Signed as Verified:	Date:
6/13/96		

Appendix A 1.1.6

WRAP-1 IPAN
Elementary Operations Test Sheet
for Site ATP

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Appendix A 1.1.7

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Revision (0)

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Test Plan Document

Site Control Tests KEH/CT 001
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Appendix A2.1: Automated Operations Test Procedure

1. Perform the operation described in the Title Block of the Test Sheet. The operation is performed as part of an automated assay in normal mode.
2. Verify that the operation is performed as described in the Operation Block.
3. Indicate Pass or Fail.
4. Provide comments on operation if applicable.
5. Sign as verified.
6. If a failure mode is available, simulate the failure during an automated assay and verify operation.
7. Indicate Pass or Fail.
8. Provide comments on operation if applicable.
9. Sign as verified.

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

TEST SHEETS: AUTOMATED OPERATIONS

Appendix A 2.1.1

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WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 1

Title	OPERATION
POWER ON STARTUP	<u>INITIAL CONDITIONS</u> None <u>INITIATION</u> Sequence is initiated by power applied to system.
Check initial conditions of I/O on power up.	

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS	OPERATION COMMENTS	
Operation: SEQUENCE 1		
PASS/FAIL		
Signed as Verified:	Date: 6/17/96	Signed as Verified: _____ Date: _____

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE	OPERATION COMMENTS	
Operation: SEQUENCE 1		
PASS/FAIL	N/A	
Signed as Verified:	Date: _____	Signed as Verified: _____ Date: _____

Appendix A 2.1.2

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 1.1

Title	OPERATION
Begin Automated assay	<u>INITIATION</u> System Status can be requested at any time. Wait for "Request to Drop off Drum" PCS to IPAN. <u>Failure Mode</u> General faults can occur at any time in the sequence causing "Drum NDA Instrument Fault" IPAN to PCS. <u>SPECIAL INTERRUPT</u> "Abort Assay" PCS to IPAN causes IPAN to discontinue assay sequence. IPAN returns, "Assay Aborted" status to PCS.

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS	OPERATION COMMENTS	
Operation: SEQUENCE 1.1 <div style="text-align: center;">PASS/FAIL</div>		
Signed as Verified:	Date: 6/13/96	Signed as Verified: _____ Date: _____

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE	OPERATION COMMENTS	
Operation: SEQUENCE 1.1 <div style="text-align: center;">PASS/FAIL</div>		
Signed as Verified:	Date: 6/13/96	Signed as Verified: _____ Date: _____

Appendix A 2.1.3

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 2

Title	OPERATION
TRANSFER PACKAGE TO IPAN	<p>Open IPAN Door. Overtravel and safety switches are enabled at all times. "Door open" is set.</p> <p><u>INITIAL CONDITIONS</u> 1. IPAN in Normal mode. 2. No package present in the IPAN. 3. IPAN Door Open.</p> <p><u>INITIATION</u> Sequence initiated by IPAN to PCS "Ready to Accept Drum."</p> <p><u>Failure Mode</u> "Transfer Failure, Stop Internal Conveyor" PCS to IPAN. Send "Drum NDA Instrument Fault" IPAN to PCS.</p> <p><u>COMPLETION</u> Send "Drum Presence Detected in Station" IPAN to PCS.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS	OPERATION COMMENTS
Operation: SEQUENCE 2 <div style="text-align: center;">PASS/FAIL</div>	
Signed as Verified: <i>C. E. W. H.</i> Date: 6/13/96	Signed as Verified: Date:

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE	OPERATION COMMENTS
Operation: SEQUENCE 2 <div style="text-align: center;">PASS/FAIL</div>	<i>Fault msg not sent</i>
Signed as Verified: <i>C. E. W. H.</i> Date: 6/17/96	Signed as Verified: Date:

→ PASSED 8/22/96
C. E. W. H.
 Appendix A 2.1.4

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 2.1

Title	OPERATION
TRANSFER DATABASE	<p>Receive Database from SIE.</p> <p><u>SPECIAL TEST</u> Check for database accuracy, verify valid drum size and status. Reference SIE interface definition document for allowed values.</p> <p><u>Failure Mode</u> Database information inaccurate. Send "Drum NDA Instrument Fault, Assay Aborted."</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 2.1		Unable to test w/o operational SIE. Check during SIE ATP.	
Signed as Verified:	Date:	Signed as Verified:	Date:
8/23/96		6/17/96

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 2.1		N/A	
Signed as Verified:	Date:	Signed as Verified:	Date:
8/23/96		

Appendix A 2.1.5

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 2.1

Title	OPERATION
<p>Energize conveyors (forward)</p>	<p>Set alignment mechanism to correct drum size. All IPAN conveyor motors energize (forward/loading). Output signal "Internal conveyor started for transfer" is set. The drum is conveyed into the cavity.</p> <p><u>FAILURE MODES</u> If the transfer fails, PCS sets "Transfer failure; stop internal conveyor."</p> <p>If drum overtravels the stop photoeye, switch S1 engages and motors stop and Send "Drum PAN fault; assay aborted."</p> <p><u>COMPLETION</u> "Send "Drum presence sensed; conveyor stopped" IPAN to PCS.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS	OPERATION COMMENTS	
<p>Operation: SEQUENCE 2.2</p> <p style="text-align: center;">PASS/FAIL</p>		
<p>Signed as Verified:</p> <p><i>G. E. [Signature]</i></p>	<p>Date:</p> <p>6/13/96</p>	<p>Signed as Verified:</p> <p>Date:</p>

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE	OPERATION COMMENTS	
<p>Operation: SEQUENCE 2.2</p> <p style="text-align: center;">PASS/FAIL</p>	<p>fault msg. not sent</p>	
<p>Signed as Verified:</p> <p><i>G. E. [Signature]</i></p>	<p>Date:</p> <p>6/17/96</p>	<p>Signed as Verified:</p> <p>Date:</p>

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Revision (0)

PASSED
8/23/96
Appendix A 2.1.6
G. E. [Signature]

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WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 2.3

Title	OPERATION
Close door	<p>The IPAN door closes, overtravel switches and pinch point safety switches are enabled at all times. Conveyor motors are disabled when IPAN door is closed.</p> <p>Output signal "Door Closed" is energized.</p> <p>FAILURE MODE <i>If obstruction gets in the path of the door closing, pressure switch S14 engages and door motor stops, reverses direction door opens and failure flag is set. Signal "System available for Monitoring" is deenergized. Send "Drum PAN failure; assay aborted" to PCS.</i></p> <p>"Package in Position for monitoring" energizes</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 2.3			
<u>PASS/FAIL</u>			
Signed as Verified:	Date:	Signed as Verified:	Date:
<i>C. E. Williams</i>	<i>6/13/96</i>		

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 2.3			
<u>PASS/FAIL</u>		<i>Fault msg not sent.</i>	
Signed as Verified:	Date:	Signed as Verified:	Date:
<i>C. E. Williams</i>	<i>6/13/96</i>		

PASSED. Appendix A 2.1.7
8/23/96
C. E. Williams

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 3

Title	OPERATION
PACKAGE MONITORING	<p><u>INITIAL CONDITIONS</u> 1 IPAN in "unattended" mode. 2 Drum present In the IPAN.</p> <p><u>INITIATION</u> Sequence initiated by successful drum transfer.</p> <p>Send "Task in Progress," IPAN to PCS.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 3			
(PASS/FAIL)			
Signed as Verified:	Date:	Signed as Verified:	Date:
6/13/96		

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 3			
PASS/FAIL		N/A	
Signed as Verified:	Date:	Signed as Verified:	Date:
N/A			

Appendix A 2.1.8

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 3.1

Title	OPERATION
Perform criticality check	<p>If criticality check is negative, proceed with assay.</p> <p><u>SPECIAL INTERRUPT</u> If criticality check is above allowable limit, send "Criticality Alert" to SIE. This interrupt is tested by lowering the upper limit in the IPAN software.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 3.1			
(PASS/FAIL)			
Signed as Verified:	Date:	Signed as Verified:	Date:
<i>[Signature]</i>	6/13/96		

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 3.1			
(PASS/FAIL)		N/A	
Signed as Verified:	Date:	Signed as Verified:	Date:
<i>[Signature]</i>	8/23/96		

"Criticality Alert" signal not tested -
requires operational SIE.
Check during SIE ATP.

[Signature]
6/17/96

Appendix A 2.1.9

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 3.2

Title	OPERATION
Perform assay	<ol style="list-style-type: none"> 1. IPAN sends "Request Strike Shape Validation Sequence" to PCS. 2. PCS sends "Ready to Observe Strike Shape" to IPAN. 3. IPAN begins sequence. 4. Operator observes waveform and responds "Strike Shape Good" or "Strike Shape Bad." 5. If "good" continue assay sequence. If "bad" abort assay and send "Drum PAN failure/Assay aborted" to PCS. <p>Align the turntable to HOME position.</p> <p>Open door. Interlocks as described above.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 3.2			
Signed as Verified:	Date:	Signed as Verified:	Date:
<i>[Signature]</i>			

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 3.2		<i>"Strike Shape Bad" failed to abort assay.</i>	
Signed as Verified:	Date:	Signed as Verified:	Date:
<i>[Signature]</i>			

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 Revision 03

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[Signature]
 Appendix A 2.1.10

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WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 4

Title	OPERATION
TRANSFER PACKAGE FROM IPAN	INITIAL CONDITIONS 1. IPAN in Normal or Manual Mode. 2. Package present in the IPAN. INITIATION Sequence initiated by the mechanical handling control system setting signal "Ready to pick up drum from station; start conveyor."

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
Operation: SEQUENCE 4			
PASS/FAIL			
Signed as Verified:	Date: 6/3/96	Signed as Verified:	Date:

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
Operation: SEQUENCE 4			
PASS/FAIL		N/A	
Signed as Verified: N/A	Date:	Signed as Verified:	Date:

Appendix A 2.1.11

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

SEQUENCE 5

Title	OPERATION
<p>Unload package</p>	<p>All IPAN conveyor motors energize in the unload direction (reverse). Package is transferred to the AGV. PCS sets signal "Drum out; Stop internal conveyor."</p> <p><u>FAILURE MODE</u> <i>If the transfer fails, PCS sets "Transfer failure; stop internal conveyor."</i></p> <p><u>COMPLETION</u> Output signal "Internal conveyor started for transfer" is deenergised. Output signal Task in Progress" is deenergised. Output signal "Available for Next Task" is energised.</p>

AUTOMATIC OPERATION PERFORMANCE NORMAL OPERATIONS		OPERATION COMMENTS	
<p>Operation: SEQUENCE 5</p> <p style="text-align: center;"><u>PASS/FAIL</u></p>			
<p>Signed as Verified:</p> <p><i>[Signature]</i></p>	<p>Date:</p> <p>6/13/96</p>	<p>Signed as Verified:</p>	<p>Date:</p>

AUTOMATIC OPERATION PERFORMANCE FAILURE MODE		OPERATION COMMENTS	
<p>Operation: SEQUENCE 5</p> <p style="text-align: center;"><u>PASS/FAIL</u></p>			
<p>Signed as Verified:</p> <p><i>[Signature]</i></p>	<p>Date:</p> <p>6/13/96</p>	<p>Signed as Verified:</p>	<p>Date:</p>

Appendix A 2.1.12

WRAP-1 IPAN
Automated Operations Test Sheet
for Site ATP

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Appendix A 2.1.13

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Test Plan Document

Site Control Tests KEH/CT 001

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FILE MENU COMMAND	OPERATION COMMENTS	CHECKED
NEW		CW 6/14/96
OPEN		
CHOOSE RUN		
CONVERT RAW DATA		
SAVE		
SAVE AS		
PRINT		
PRINT PREVIEW		
PRINTER SETUP		
EXIT		
VIEW MENU COMMAND	OPERATION COMMENTS	CHECKED
TOOLBAR		CW 6/14/96
STATUS BAR		
CLEAR		
DATABASE INFO		
RUNTIME PARAMETERS		
SYSTEM STATUS		
PLC STATUS		
ACTIVE DATA		
PASSIVE DATA		
ACTIVE MATRICES		
PASSIVE MATRICES		
MULTIPLICITY REPORT		
RECONSTRUCTION DATA		
RECONSTRUCTION IMAGE		
FINAL REPORT		
ASSAY MENU COMMAND	OPERATION COMMENTS	CHECKED
LOCAL ASSAY MODE		CW 6/14/96
AUTOMATIC ASSAY MODE	SEE NOTE 1	
DIAGNOSTICS MENU COMMAND	OPERATION COMMENTS	CHECKED
CAMAC	WHERE IS PASSWORD PROTECTION?	CW 6/14/96
MODULES	OK	
PLC	CW 6/14/96	
STEPPER MOTOR		
ROTATE TABLE		
TCP/IP SERVER		
PCS CLIENT		
SIE CLIENT		
DATA ACQUISITION		
STOP ACQUISITION		
PARAMETERS MENU COMMAND	OPERATION COMMENTS	CHECKED
RUN TIME		CW 6/14/96
PULSES AND TIMES		
GATES AND TIMINGS		
HELP MENU COMMAND	OPERATION COMMENTS	CHECKED
INDEX		CW 6/14/96
USING HELP		
Signed as verified: (KPH)	Date: 6/14/96	Signed as Verified: (PSC)
		Date:

CONVERT
CURRENT
ASSAY

CRITICALITY
CHECK

THESE ARE
SUPPOSED
TO BE
PASSWORD
PROTECT

USER MENU

NOTE 1 - AUTO ASSAY MODE CAN'T BE STOPPED USING "STOP ASSAY" (STOP SIGN) BUTTON ON TOOLBAR. RESULTS IN SYSTEM ERROR MESSAGE WHICH DOES NOT CLEAR FROM SCREEN. THIS STOP BUTTON SHOULD STOP ANY ASSAY.

NOTE 2 - WHEN SELECTING "CRITICALITY CHECK" BUTTON IS SELECTED, RESPONSE IS THAT SYSTEM MUST BE IN AUTO MODE TO PERFORM THIS FUNCTION. AUTO ASSAY MODE PERFORMS IT AUTOMATICALLY, AND THE BUTTON IS DISABLED IN THIS MODE. WHY DOES

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6/14

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Appendix A4.1: Software Error Checklist

SOFTWARE ERROR CHECKLIST

Note: Where switches are available and readily accessible, errors will be generated by actuating these switches. When the errors must be simulated they will be simulated with an appropriate input signal to the PLC.

Software Reported Error	OPERATION COMMENTS	CHECKED
"Emergency Stop"		QW 6/14/96
"Drum In Overtravel"		QW 6/14/96
"Door Open Overtravel"		QW 6/14/96
"Door Close Overtravel"		QW 6/17/96
"Door Safety Switch"		QW 6/19/96
"Door Detectors In Overtravel"		QW 6/17/96
"Door Detectors Out Overtravel"		QW 6/14/96
"Roller Motor Fail"		QW 6/14/96
"Detector Actuator Failed"		QW 6/17/96
"Door Motor Fail"		QW 6/17/96
"Door Motion Timeout"		QW 6/14/96
"Detector Motion Timeout"		QW 6/14/96
"Aligner Motion Timeout"		QW 6/17/96
"Load / Unload Timeout"		QW 6/14/96
"Unknown Position"	Unable to duplicate.	
Comments Identify source of "Unknown Position" error message. Delete if unnecessary		
Signed as verified: (KEH)	Date:	Signed as verified: (PSC)
<i>[Signature]</i>	6/17/96	