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Accession #: D197092866

Document #: SD-WM-ATR-157

Title/Desc:

ATR FOR CORE SAMPLE X RAY SYS 2 & 3 & 4

Pages: 185

FEB 12 1996 (21) **ENGINEERING DATA TRANSMITTAL**

Page 1 of 1
1. EDT **№ 614657**

2. To: (Receiving Organization) Characterization Equipment Dev (75220)		3. From: (Originating Organization) Characterization Equipment Design (75230)		4. Related EDT No.: 613783	
5. Proj./Prog./Dept./Div.: Characterization Proj/N4H4E		6. Cog. Engr.: J. R. Weber		7. Purchase Order No.: MDW-XDV-428742	
8. Originator Remarks: The attached Supporting Document WHC-SD-WM-ATR-157, Rev 0 Releases the Acceptance Test Reports on XR1 Systems 2, 3, and 4.				9. Equip./Component No.: NA	
				10. System/Bldg./Facility: NA	
				12. Major Assm. Dwg. No.: NA	
				13. Permit/Permit Application No.: NA	
11. Receiver Remarks:				14. Required Response Date: ASAP	

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-WM-ATR-157		0	ATR for X-Ray Systems 2, 3, and 4	Q	1,2		

16. KEY		
Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)										(G)	(H)
Reason	Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp.
1,2	1	Cog. Eng. JR Weber	<i>[Signature]</i>	2/1/96	S7-12						
1,2	1	Cog. Mgr. DW Hamilton	<i>[Signature]</i>	2/1/96	S7-12						
1	1	QA DC Board	<i>[Signature]</i>	2-1-96	S7-07						
1,2	1	CED. Mgr. CE Hanson	<i>[Signature]</i>	2/5/96	H5-09						
3		RE Raymond			S7-12						
		Central Files			A3-88						

18. <i>[Signature]</i> Signature of EDT Originator	19. <i>[Signature]</i> C.E. Hanson Authorized Representative Date for Receiving Organization	20. <i>[Signature]</i> D. W. Hamilton Cognizant Manager Date	21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
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ATR FOR CORE SAMPLE X-RAY SYSTEMS 2, 3, AND 4

J. R. Weber

Westinghouse, Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: 614657

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Org Code: 75230

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Total Pages: 170

Key Words: Mobile, X-Ray, Test, Core, Sample, System, ATR, XRI

Abstract: This Acceptance Test Report (ATR) documents the results, including exceptions and resolutions, to the ATP's performed for the X-Ray Imaging systems 2, 3, and 4.

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Karen G. Nolan 2/12/96
Release Approval Date
Release Stamp

Approved for Public Release

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Core Sample X-Ray Systems 2, 3, and 4
Acceptance Test Report

Prepared By:

James R. Weber
Westinghouse Hanford Company

January 1996

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MOBILE X-RAY IMAGING SYSTEM

1.0 ACCEPTANCE TEST REPORT

1.1 Procurement

Three additional Mobile Core Sample Radiographic Examination Systems were procured through the competitive process by Request for Procurement (RFP) Number 428742. It was desired that these systems would be functionally identical with the initial/prototype Core Sample X-ray Imaging System obtained with/through RFP No. 357409. Two of these three systems were received at Richland, Washington on November 15, 1995 and the third system provided by this procurement request was received at Richland, WA, on December 14, 1995. Upon receipt, the initial two systems designated numbers 002 and 003 by the vendor and "so-noted" in the initial Vendor Run Acceptance Test Procedure (ATP) test reports had their designations inadvertently switched in receiving. Vendor Unit 002 became WHC Unit 003 (HO-60-6043) and Vendor Unit 003 became WHC Unit 002 (HO-60-6042) as noted on the Receiving NCR in Appendix M. This report documents the acceptance testing and deployment-to-field agenda for these units. The first of these units was available for field use on December 6, 1995, and the third unit, system 004, was ready for field use (deployable) on December 28, 1995.

1.2 Testing

As specified in the contract document, the three assembled units of this series of X-ray inspection systems were functionally tested by Westinghouse Hanford personnel, at the vendors facility in New Haven, CT.. Units 1, 2, and 3 were consecutively tested on November 2, 1995, November 13, 1995 and December 4, 1995 and received at Richland, Washington as noted above. Two exceptions were taken to the Vendor run Acceptance Test Procedures (WHC-SD-WM-ATP-157), one, the cabinet safety interlock system was not fully functional and hence, could not be tested at the vendors facility, and the audio recording requirement capability was "struck-out" of the functional requirements by the Test Director with concurrence by the Non-destructive Examination representative. It was also determined that the "lines pair" test was a better measure of overall system resolution performance than the ASTM pentrameter test, hence, this verification was deleted from further test requirements.

1.3 Changes and Improvements

The following are the required contractual changes and suggested improvements to the new X-ray systems which were agreed to by VJ Technologies. Those items noted have been included at no additional cost in Core-sample Examination Systems 002, 003 and 004. Since these units are mobile, trailer mounted and/or portable, they carry Hanford identification numbers HO-60-6042, HO-60-6043 and HO-60-6044, respectively. The improvements described here-in, minor alterations or changed requirements are not currently included in Mobile X-ray System No. 1.

1. Enclosed, 4 X 8 inch, steel tube, Forklift pockets are incorporated in the cabinet base frames of systems 002, 003 and 004.
- * 2. The equipment in front bottom cabinet is re-arranged;
 - The X-ray tube cooler is moved to the extreme right-hand side.
 - The X-ray power supply/high-voltage tank is in the center of the lower control cabinet. (This should maximize cooling efficiency and serviceability)
 - The x-ray power supply is located and secured "square" with the cabinet)
- * 3. The display monitors and shutter controls are located to the right side of front upper cabinets, and S-VHS recorder and thermal printer to the left. This is ergonomically better since the paper from thermal printer paper out-put won't cover X-ray control display. The entire upper control console was designed so that the individual items and component groups slide out for easy access.
4. A supplemental, 100 cfm, cooling fan is installed on the cabinet adjacent the printer and S-VHS recorder. Air is filtered before the fan, with the air flow directed into the cabinet. This should reduce the cabinet "heat load" from these two components. We have encountered "thermal trips" with the printer on System No. 1.
- * 5. A 100 cfm cooling fan and a filter have been added behind the camera/lens enclosure baffle. This fan forces ambient cabinet air into and through the main X-ray enclosure resulting in approximately 0.02 inch of water, positive pressure on the X-ray enclosure, when measured at the contamination sleeve (entry port).
- * 6. An "Environmental" key board is provided for the image processor. We have encountered a problem with sand in the keyboard with system No. 1.
- * 7. The "Keyboard" is moved to a bottom position in keyboard/processor slot.
8. The "safety interlock" junction box is a NEMA junction box and includes a terminal strip which provides for easier "electrical" testing of the safety interlocks.
- * 9. A removable "fuse" access panel was added to X-ray power supply cover for this application, since the power supply access cover cannot be removed without removing the unit from the cabinet .
10. The upper cabinet exterior blinking warning light is a "base mounted" rather than "conduit mounted" type.

- * 11. Heavier gage "stranded" wiring is provided on exterior warning light.
- * 12. A "Piano" type hinge is provided on control console cover door and the main power supply.
- 13. The lower front cabinet is increased from 26" height to 28" height to provide for easier removal of the X-ray power supply and X-ray cooler for servicing. The entire front panel of the lower cabinet is removable with two latches and a single fastener.
- 14. A 1/4 inch, removable, enclosed lead mask is provided between Image Intensifier face-plate and shutters.
- 15. A wider/longer, more stable X-ray tube collar mount was provided which allows more accurate focusing of the X-ray beam.
- 16. A better mounting system/collar is provided on X-ray tube-head shutters. Philips MCN-165 X-ray tubes are provided with system Nos. 002, 003 and 004. Additional clearance has been provided, allowing more clearance around the cabinet exit port for easier servicing of the high voltage cable.
- * 17. A "Mounting plate/sheet" is provided for the Cam-lock adapter bolts to retain bolts in holes in the cabinet lid, with nuts on the exterior of the cabinet removed.
- 18. The X-ray cabinet interior sample duct was re-designed to allow for the interlock switch to be placed closer to the pvc contamination sleeve. On systems 002, 003 and 004, the duct was made wider (5.375 as compared to 3.00 inches) and taller to reduce the risk of spreading contamination to the interior of the x-ray cabinet.
- * 19. A return assist spring is provided on the "Telemechanique" interlock switch rod at the Cam-lock adaptor on systems 002 and 003. System 004 has an entirely different interlock switch at the Cam-lock adaptor, which is exterior to the X-ray cabinet, for reasons later described.
- 20. The "Turmoil" X-ray cooler is fused off the top of the main 50 Amp fuse blocks, F1 and F2, on X-ray power supply. This modification from system No. 001, allows the X-ray tube cooler to be run without the X-ray control system energized. This is a Philips "Manufacturers" recommendation for this application. Internal 6 Amp. circuit breakers are provided at the "Turmoil" cooler power switch.
- * 21. An on/off switch is provided for the rear cabinet utility light.
- 22. An independent speed control adjustment for the inward

movement is provided for the horizontally sliding lead shutters on the X-ray tube. This option allows the X-ray system operator to more accurately and precisely control the X-ray tube shutter adjustment for the optimum image quality.

1.4 Approval and Acceptance

All three of these systems were subjected to a NEC electrical inspection following receipt. All three were acceptable and have been appropriately labeled.

All three systems have undergone Acceptance Tests at the Hanford Site to verify that no changes occurred to the systems in transit and that the units functioned as intended. The results of all three tests are found in Appendices E, H, and K and have been presented to a Joint Test Group (JTG) board for approval and acceptance. Preliminary tests were performed at the vendor facility in anticipation of acceptance tests at Hanford. It is documented in the meeting minutes of the JTG that these units are acceptable for "Field Use" and deployment to "Tank Farm Operations" as noted in the attachments.

When received, System 004 had the fewest number of operating hours (3.1 total hrs) of any of the X-ray units. Following completion of the ATP the unit was under-going further run-in prior to being deployed to the field. A series of intermittent "tube arcing" shutdowns was experienced while performing the acceptance tests. The high voltage cable was re-greased twice at both the generator and the tube-head. These trips were initially attributed to surges in the 306E building power supply bus. The faults were recorded in the system logbook. On the evening of January 2, an erratic fluctuation of the kilovoltage display was again noticed and three "tube arcing" shutdowns occurred. On January 3 the vendor (V. J. Alreja) and the Philips factory service representative were contacted and it was decided to replace the X-ray power supply and high-voltage generator as a unit, with the spare system from the 306 NDE vault. After replacement of the power supply and generator the system performed satisfactorily. The ATP was repeated for those portions relating to the x-ray control system. This additional ATP is included in this test report. The faulty power supply and generator are being returned to the Philips service center in Alpharetta, GA.

1.5 Modifications

System number 004 (HO-60-6044) was modified, upon receipt, to provide a minimum of two sealed spaces (barriers) between the core segment sampler and the electrical equipment in the "main" X-ray cabinet should the sampler integrity fail. The Cam-lock safety interlock switch has been moved to the exterior of the cabinet and the Cam-lock adaptor coupling. The sample "duct" has been isolated from the cabinet interior by a series of gaskets and sealants which should prevent any migration of gas from the sampler segment following failure of the sampler and the contamination sleeve, to the electrical equipment in the main X-ray cabinet. This modification will provide the barriers necessary to allow system No. 4 to be used in a potentially "flammable gas" waste tanks. These modifications, were made with the vendors concurrence and knowledge though

they were clearly "out-of-the-scope" of the original procurement request for these units (systems 002-004).

* Suggested improvements noted

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APPENDIX A

NEC INSPECTION REPORTS

NEC INSPECTION REPORT

Project/W.O. No. PO# WDW-XDV-428742	Building No. 306E	Code Edition NEC, 1993 Edition	Report No. 6022
Inspection Requested By JR WEBER	Phone 373-5316	Inspector Dykeman RG	Phone 376-2235
			Page 1 of 1
Item Inspected: SERVICE INSPECTION OF HO-64-6042 AND HO-64-6043 MOBILE CORE SAMPLE X-RAY IMAGING SYSTEM.			

Condition Found: ☒ Acceptable ☐ Unacceptable (see description below)

Inspector Signature: Original Inspection Date: Nov. 27, 1995 Closure Date:

	Description of NEC Violation	Cause Code	Days to Correct	Violation Corrected	Date
1					
2					
3					
4					
5					
6					
7					

Electrical service will be discontinued for the equipment or facility identified if violations are not corrected within time allowed by the "Days to Correct" column. "Days to Correct" starts with the original inspection date. For concerns regarding this, call the Chief Electrical Engineer at 376-6347.

NEC INSPECTION REPORT

Object/W.O. No. O #WDW-XDV-428742	Building No. 306E	Code Edition NEC, 1993 Edition	Report No. 6036
Inspection Requested By JR WEBER	Phone 373-5316	Inspector Dykeman RG	Phone 376-2235
		Page 1 of 1	
Item Inspected: SERVICE INSPECTION OF HO-64-6044 MOBILE CORE SAMPLE X-RAY IMAGING SYSTEM.			
Condition Found: ☒ Acceptable ☐ Unacceptable (see description below)			
Inspector Signature: RG DYKEMAN		Original Inspection Date Dec. 21, 1995	Closure Date
	Description of NEC Violation	Cause Code	Days to Correct
1			
2			
3			
4			
5			
6			
7			

Electrical service will be discontinued for the equipment or facility identified if violations are not corrected within time allowed by the "Days to Correct" column. "Days to Correct" starts with the original inspection date. For concerns regarding this, call the Chief Electrical Engineer at 376-6347.

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APPENDIX B

JOINT TEST GROUP REPORTS

Author: Christina A (Tina) Reed at ~CCHIG001
 Date: 12/1/95 3:42 PM
 Priority: Normal
 TO: Donald C Board at ~WHC167
 TO: Dawn J Lawrence at ~WHC130
 TO: John M Garcia at ~WHC289
 TO: Dennis W Hamilton at ~WHC117
 TO: Carl E Hanson at ~WHC207
 TO: James C (Jim) Krogness at ~WHC306
 TO: Lisa R Montague at ~WHC130
 TO: James R Weber at ~WHC128
 TO: Detlev L Wegener at ~WHC272
 TO: Gloria J Williams at ~WHC117
 CC: Christina A (Tina) Reed at ~WHC128
 Subject: LANCAL: 12/04/1995, 9:15a-10:15a

----- Message Contents -----

Meeting Time: Monday December 4, 1995, 9:15am-10:15am

Description: JTG for X-Ray Imager #2
 2704/G134
 POC Tina 373-1301

Scheduled by: Burton, Judith G (Judy) (CAR)
 December 1, 1995, 3:41pm

Attendees: Board, Donald C
 Burton, Judith G (Judy)
 notice sent to Lawrence, Dawn J
 Garcia, John M
 Hamilton, Dennis W
 Hanson, Carl E
 Krogness, James C (Jim)
 Raymond, Richard E
 notice sent to Montague, Lisa R
 Weber, James R
 Wegener, Detlev L
]2704HV/G134/200E
 notice sent to Williams, Gloria J

[429] From: Christina A (Tina) Reed at ~WHC128 12/7/95 8:54AM (2790 bytes: 60 ln)
 To: Judith G (Judy) Burton at ~WHC15, John M Garcia at ~WHC289,
 Dennis W Hamilton at ~WHC117, James C (Jim) Krogness at ~WHC306,
 Michael L McElroy at ~WHC235, Christina A (Tina) Reed, James R Weber,
 Detlev L Wegener at ~WHC272
 Subject: MEETING MINUTES

----- Message Contents -----
 MEETING MINUTES

Subject: JOINT TEST GROUP MEETING

TO: Distribution BUILDING 2704HV/G134

FROM: D. L. Wegener CHAIRMAN D. L. Wegener

Department-Operation- Component	Area	Shift	Date of Meeting	Number Attending
TWRS CPO	200E	Day	December 5, 1995	5

ATTENDEES: D. W. Hamilton S7-12
 J. C. Krogness L6-36
 M. L. McElroy S7-07
 J. R. Weber S7-12
 D. L. Wegener S7-01

PURPOSE: Determine if the Unit 2 X-Ray Imager is ready for field use.

Procedures should be out by the afternoon of December 6, 1995. This was a pre-use action (number 95-007).

Jim Weber reviewed the differences between Unit 1 (which has been reviewed by the JTG) and Unit 2.

Training has been given to the technician.

Vendor information has changes incorporated.

Field technicians conducted a test run downtown. The test run resulted in the issuing of JTG Work Authorization #95-007. This authorizes the field use of Unit 2 after the PIC verifies that a procedure is present at the job site and is specific to Unit 2.

Printouts will be the same between Unit 1 and 2.

Two exceptions to the ATP were documented. They were resolved to the JTG's satisfaction.

Radi survey of the cabinet was presented and found to meet acceptable limits.

Unit 1 had a situation where the lid became deflected. Unit 2 has been designed with more support and a better switch position.

NEC inspection was completed with no problems found.

The Cam-Lock is turned to correct direction.

There were no ECNs written on this piece of equipment.

The next meeting will be held December 8, 1995, at 11:00 in 2704/G134.

A-3000-480 (10/94) GEF011

[433] From: Detlev L Wegener at ~WHC272 12/4/95 5:03PM (1853 bytes: 22 ln)
 To: F A (Fred) Schmorde at ~WHC117, James S (Jim) Lee at ~WHC117,
 nny C (Dan) Hartley at ~WHC117, Blinn L Jr (Butch) Hall at ~WHC117,
 ...chael C (Mike) Jones at ~WHC117, Robert F (Frank) Frost at ~WHC128
 cc: Judith G (Judy) Burton at ~WHC15, Ted J Davis at ~WHC130, Troy R Farris at
 ~WHC117, G T (Tom) Frater at ~WHC128, John M Garcia at ~WHC289,
 Dennis W Hamilton at ~WHC117, Theodore D Jarecki at ~WHC130,
 W J (Wally) Kennedy at ~WHC130, Dana C Langlois at ~WHC130, Michael L McElroy
 at ~WHC235, Keith E (Gus) Myers at ~WHC130, John S Schofield at ~WHC130,
 Jeffory L Smalley at ~WHC128, Jon S Sparks at ~WHC128, Detlev L Wegener,
 James R Weber at ~WHC128, James C (Jim) Krogness at ~WHC306,
 Robert N (Rob) Dale at ~WHC130
 Subject: JTG WORK AUTHORIZATION #95-007: XRI UNIT 2 REVIEW

----- Message Contents -----

Today, the JTG met to review the field readiness of the
 XRI-Unit 2.

The following was determined:

There was ONE PRE-FIELD USE ACTION identified by trhe JTG.

ACTION: The PIC must insure the procedure for Unit 2 is at
 the job site and is specifically for Unit 2 before the
 XRI-Unit 2 is used in the field.

BACKGROUND: Insure the Unit 1 procedure is not being used.
 Unit 1 and Unit 2 are different. Therefore, the procedures
 need to be specific to the unitto be utilized. Once we
 receive Unit 3 and 4, one procedure may cover Units 2, 3 and
 4.

Unit 2's procedure was to be completed by COB today.

Det Wegener
 Acting Chairman, CPO-JTG

[433] From: Christina A (Tina) Reed at ^CCHIG001 12/6/95 2:43PM (1248 bytes: 19
In)
To: Dawn J Lawrence at ^WHC130, John M Garcia at ^WHC289, Dennis W Hamilton at
^HC117, James C (Jim) Krogness at ^WHC306, Michael L McElroy at ^WHC235,
James R Weber at ^WHC128, Detlev L Wegener at ^WHC272, Gloria J Williams at
^WHC117
cc: Christina A (Tina) Reed at ^WHC128
Subject: LANCal: 12/08/1995, 11:00a-12:00p

----- Message Contents -----

Meeting Time: Friday December 8, 1995, 11:00am-12:00pm

Description: JTG MTG - X-RAY IMAGING EQUIPMENT UNIT 3
2704/G134
POC Tina 373-1301

Scheduled by: J2704HV/G134/200E (CAR)
December 6, 1995, 2:36pm

Attendees: Burton, Judith G (Judy)
notice sent to Lawrence, Dawn J
Garcia, John M
Hamilton, Dennis W
Krogness, James C (Jim)
McElroy, Michael L
Weber, James R
Wegener, Detlev L
J2704HV/G134/200E
notice sent to Williams, Gloria J

[440] From: Christina A (Tina) Reed at ~WHC128 12/11/95 9:22AM (1804 bytes: 36 1
n)

To: Judith G (Judy) Burton at ~WHC15, John M Garcia at ~WHC289,
Annis W Hamilton at ~WHC117, James C (Jim) Krogness at ~WHC306,
Michael L McElroy at ~WHC235, Christina A (Tina) Reed, James R Weber,
Detlev L Wegener at ~WHC272

Subject: JOINT TEST GROUP MEETING - UNIT 3 APPROVAL

----- Message Contents -----

MEETING MINUTES

Subject: JOINT TEST GROUP MEETING

TO: Distribution BUILDING 2704/G134

FROM: D. L. Wegener CHAIRMAN D. L. Wegener

Department-Operation- Component	Area	Shift	Date of Meeting	Number Attending
TWRS CPO	200E	Day	December 8, 1995	7

PURPOSE: To determine if X-Ray Imager Unit 3 is acceptable for field use.

Reviewed the three exceptions to the ATP. All were resolved to the JT ; satisfaction.

Radiological test was completed and was found to be within the acceptable limits.

NEC assessment was completed with no problems found.

The procedure is the same as the procedure to be used with Unit 2.

Unit is correctly labeled.

The JTG determined that the X-Ray Imager Unit 3 is acceptable for field use. JTG work authorization 95-008 will be sent to appropriate personnel.

A-3000-480 (10/94) GEF011

[471] From: Dawn J Lawrence at ~CCHIG002 12/27/95 1:12PM (999 bytes: 17 ln)
To: Dawn J Lawrence at ~WHC130, Ralph U Elwell at ~WHC130, John M Garcia at
~WHC289, Lisa R Montague at ~WHC130, James R Weber at ~WHC128,
Detlev L Wegener at ~WHC272
Subject: LANCal: 12/28/1995, 1:00p- 2:00p

----- Message Contents -----

Meeting Time: Thursday December 28, 1995, 1:00pm- 2:00pm

Description: JTG Meeting
2704/G206
POC Tina 373-1301

Scheduled by: Reed, Christina A (Tina) (DJL)
December 27, 1995, 1:09pm

Attendees: Burton, Judith G (Judy)
notice sent to Lawrence, Dawn J
Elwell, Ralph U
Garcia, John M
Raymond, Richard E
notice sent to Montague, Lisa R
Weber, James R
Wegener, Detlev L

[473] From: James R (Jim) Weber at ^PNL41 12/28/95 2:25PM (3736 bytes: 1 ln)
 To: James R Weber at ^WHC128
 Subject: JTG MEETING MINUTES - XRAY UNIT 4 IMPLEMENTATION

----- Forwarded -----

From: Christina A (Tina) Reed at ^WHC128 12/28/95 2:21PM (3435 bytes: 1 ln)
 To: Ralph U Elwell at ^WHC130, Jon S Sparks, Detlev L Wegener at ^WHC272,
 Richard E Raymond at ^WHC15, James R (Jim) Weber at ^PNL41
 cc: Christina A (Tina) Reed, Ellen E Thornton at ^WHC23, Judith G (Judy) Burton
 at ^WHC15
 Subject: JTG MEETING MINUTES - XRAY UNIT 4 IMPLEMENTATION

----- Message Contents -----

Text item 1: Text_1

MEETING MINUTES

Subject: JOINT TEST GROUP MEETING

TO: Distribution BUILDING 2704/G206

FROM: D. L. Wegener CHAIRMAN D. L. Wegener, Acting Chairman

Department-Operation- Component	Area	Shift	Date of Meeting	Number Attending
TWRS CPO	200E	Day	December 28, 1995	5

Attendees: R. Elwell S7-12
 R. Raymond (Eng Rep) S7-12
 J. Sparks (ESQ Rep) S7-07
 J. Weber S7-12
 D. Wegener (Ops Rep) S7-01

cc: J. S. Schofield S7-12
 E. E. Thornton S7-01

PURPOSE: To determine if X-Ray Imager Unit 4 is acceptable for field use.

Reviewed the two exceptions to the ATP. All were resolved to the JTG's satisfaction.

Radiological test was completed and was found to be lower than the acceptable limits at .1 mr/hr.

NEC assessment was completed with no problems found. Blue tag is in place.

The procedure is the same as the procedure to be used with Unit 2.

Unit is correctly labeled.

Appropriate training has been held with the operators.

The printer is operational.

Unit 4 has been modified by relocation of the cutout switch on the Cam-Lock.

This will make the protective PVC disposable. Replacing the PVC will be determined by dose rate and a procedure will be written to incorporate this into the operational procedure system.

On: Write a procedure for the replacement of contaminated PVC protective covering.

Actionee: J. S. Schofield ECD: February 29, 1996

The vendor will provide drawings reflecting the modifications to Unit 4. Units 2 and 3 will also be modified with the new switch on their next scheduled outage.

Action: Work with the V.L. Technologies to make the appropriate changes to the Unit 4 drawings number 902MOBL and 902E001.

Actionee: J. R. Weber ECD: February 15, 1996

In order to protect the sampler if it drops in the sleeve, a cup of kitty litter has been placed in the bottom of the sleeve. There are 12 inches of space at the bottom of the sleeve.

The JTG determined that the X-Ray Imager Unit 4 is acceptable for field use. JTG Work Authorization #95-009 will be sent to appropriate personnel.

70-480 (10/94) GEF011→

APPENDIX C

RELEASE TO OPERATE, XR1-002

**Westinghouse
Hanford Company****Internal
Memo**

From: Nondestructive Examination
Phone: 376-8061 L6-36
Date: November 29, 1995
Subject: INITIAL OPERATION APPROVAL FOR CORE SAMPLE X-RAY CART HO-64-6042
(UNIT #2).

To: J. R. Weber S7-12
cc: File/LB

The Core Sample X-ray Cart, HO-64-6042 (Unit #2) is approved for initial (normal) operation. This approval is based on the manufacturer building the system to the requirements of 21 CFR 1020.40 and ANSI N43.3. In addition Radiological Control has successfully completed an interlock functionality inspection, and has determined that all accessible areas are below .5 mR/hr at a distance of 5 cm.

Approved By:

J. K. Keve
NDE RGD Safety Officer

J. C. Kroghness
NDE RGD Manager

D. R. Ekstrom
300 Area Radiological Control Manager

B. H. Christiansen
RGD SCE

APPENDIX D

RADIATION SURVEY REPORT(S), XR1-002

Westinghouse Hanford Company - Health Physics RADIOLOGICAL SURVEY REPORT

Survey No.

194957.

Date _____

12.1.93-

Time

Time 1245
1430

RWP No.

R-107/001

Page

7

01

2

Area/Bldg./Room/Location (Code)

300-306E - Hi Bay

F.C.

R

Job Description

Job Description Survey of HO-64-6042
(after the voltage cable core
was removed & regreased) for
leakage - Operated by Qualifier
Operator @ 160 KV - 18 min

Purpose of Survey (check appropriate box(es)):

Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill

Alarm Response: ☐ CAM, ☐ ARM(RAM), ☐ PSD

☐ HRA/VHRA Work ☒ Job Coverage

☒ Exposure Incident ☐ Material Release

☐ RM Transfer/Shipment ☐ Required, Task No.

Map/Sketch

104

N/A

DA

12

[illegible]

Continued on page 2

Air Sample Results (uCi/ml)			
	BZ	GA	
			Initial Decay
α 1			
β 1			
α 2			
Σ 4			

Legend

④ - Smear Location

- Air Sample Location

☒ - Large Area Smear

* - Contact Reading

Other

BD-6000-010R (01/94)

Westinghouse Hanford Company - Health Physics RADIOLOGICAL SURVEY REPORT						Survey No. 194954				
Date 11.30.95		Time 1230 1515		RWP No. R-107/001		Page 1 of 2				
Area/Bldg./Room/Location (Code) 300-328 306F-Ni Bay						F.C. R				
Job Description Start up & Semiannual radiation survey of - XRI Cell #2 HO-64-6042 tested & accepted.				Purpose of Survey (check appropriate box(es)): Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill Alarm Response: ☐ CAM, ☐ ARM(RAM), ☐ PSD ☐ HRA/VHRA Work ☒ Job Coverage ☐ Exposure Incident ☐ Material Release ☐ RM Transfer/Shipment ☐ Required, Task No.						
Map/Sketch										
<div style="position: relative; width: 100%; height: 100%;"> NA NA NA NA </div>										
No.	Description	Dist.	DOSE RATE			CONTAMINATION LEVELS				
			B (non-pen) mrad/h	γ (pen) mR/h	n mrem/h	Direct (dpm/probe)		Smear (/100cm ²)		
			B	γ	n	B	α	B (dpm)	α (dpm)	mrad/h
1	Max leakage - Cam lock adapted	C	<0.5	0.3	—	7K	<500	<1K	<20	—
2	HO-64-6042	C	<0.5	<0.5	—	—	—	—	—	—
3	HO-64-6042	3m	<0.5	<0.5	—	—	—	—	—	—
NA										NA
Continued on page 2										
Air Sample Results (μCi/ml)						Legend				
	BZ	GA	Initial	Decay		(S) - Smear Location (Δ) - Air Sample Location [] - Large Area Smear * - Contact Reading Other _____				
α 1										
B 1										
α 2										
134										

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APPENDIX E

HANFORD SITE ATP, XR1-002

RR WHC-SD-WM-ATP-157
REV 0

HANFORD SITE ATP ON SYSTEM
HO-64-4062
6042 JAW 12/6/95

**MOBILE X-RAY IMAGING SYSTEM
ACCEPTANCE TEST PROCEDURE
FOR
PURCHASE ORDER NUMBER MDW-XDV-428742**

*Do Not REMOVE
"RED-LINE"*

CLOSURE SHEET PAGE 14 JAW 12/7/95

Author

J. R. Weber

Rel. WHC-SD-WM-ATP-157
REV 0

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REL WHC-SD-WM-ATP-157
REV 0

**MOBILE X-RAY IMAGING SYSTEM
ACCEPTANCE TEST PROCEDURE
FOR
PURCHASE ORDER NUMBER MDW-XDV-428742**

1.0 PURPOSE OF THE TEST

This Acceptance Test Procedure (ATP) has been prepared to demonstrate that each of the mobile X-Ray Imaging (XRI) systems will function as intended by the Westinghouse Hanford Company (WHC) procurement requisition 428742 and all relevant alterations. This document was prepared in compliance with *WHC-CM-6-1; Standard Engineering Practices, EP-4.2, Testing Practices.*

This document is related to the Acceptance Test Procedure WHC-SD-WM-ATP-133 which documents the tests performed on the "Prototype" Core-sample X-ray imaging system. For this reason, changes from the referenced ATP are shown in "red-line" text in this document. The test results will be issued as an Acceptance Test Report (ATR), WHC-SD-WM-ATR-157, after all testing is complete. The test will be performed at the vendor's facility prior to shipment to the Hanford Site and portions of the ATP will be re-run following shipment from the vendor to verify that no changes occurred in transit. This is specified in the contract documents.

1.1 SYSTEM DESCRIPTION

The XRI system is a mobile real-time radiographic system designed to safely examine radioactive tank core segments collected at the Hanford site. The mobile XRI System is designed to meet the requirements of 21 CFR 1020.40, ANSI N43.3, and applicable Washington State licensing requirements.

2.0 RESPONSIBILITIES

The test shall be performed by a test director from the WHC at the vendor facility. The test director shall be a person technically qualified and knowledgeable of the safety requirements associated with the testing.

Each company or organization participating in the conduct of this test will designate personnel to assume the responsibilities and duties as defined herein. The names shall be provided to the recorder for listing on the recorder's copy of the test execution sheet prior to the performance of any part of the test.

R.R. WHC-SD-WM-ATP-157
REV 0

2.1 TEST DIRECTOR

The WHC shall provide a test director to coordinate all acceptance testing. The Test Director shall:

- The test director is responsible for assuring that the test is performed in accordance with this document. The test director's duties include, but are not limited to: coordinating and oversight of test performance, signing or designating an authority to sign the completion of each indicated step and resolve exceptions to this test.
- The test director shall decide whether to continue the test after the discovery of an exception [See Section 3.0]. The test shall not continue without resolving and repairing a non-conformance unless the test director determines that the non-conformance will not jeopardize personnel or equipment.
- Confirm that field testing and inspection of the system or portion of the system to be tested has been completed.
- Stop any test which may pose any danger to personnel or cause damage to the system until the test procedure has been revised.
- Evaluate recorded data, discrepancies, and exceptions.
- Obtain from the design engineer any information or changes necessary to clear or resolve objections.
- Signs the Execution and Test Approval Sheet.
- Signs any Exception Sheets when any required retest has been executed and accepted.
- Obtain required signatures on the ATP master prior to reproduction and distribution.

2.2 TEST OPERATOR

The vendor shall provide a Test Operator. The Test Operator shall:

- Perform the test under the direction of the Test Director.
- Provide labor, equipment, and test instruments required for performing tests.

~~Rev.~~ WHC-SD-WM-ATP-157
REV 0

- Confirm that all equipment required for performing tests will be available at the start of testing.
- Sign the Execution and Test Approval Sheet.

2.3 TEST RECORDER

A Test Recorder to record all acceptance testing will be provided. The Test Recorder shall:

- Prepare a field copy from the ATP Master.
- Record the names of all designated personnel on the Field copy of ATP prior to start of testing.
- Record test instrument identification numbers and calibration expiration dates as required.
- Initial and date every test step on the Field copy as it is completed.
- Record objections and exceptions on an Exception Sheet.
- Sign the Execution and Test Approval Sheet when Test has been performed.
- After test is completed, assign alpha numeric page numbers to any added Exception Sheets and records page numbers in the Table of Contents.
- Sign Exception Sheet(s) when exceptions have been resolved.
- Transfers Filed copy entries to the ATP Master in ink, signs, and dates. Transmits the Master to the Test Director for approval signature routing.

2.4 QUALITY ASSURANCE

The WHC Quality Assurance (QA) organization shall:

- Review and approve exception resolutions, and shall review and accept test results.
- Shall review and approve each exception; this approval may be obtained at the time the resolution is written OR QA approval may

Ref. WHC-SD-WM-ATP-157
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be postponed until a QA representative reviews the test results, following test completion, at the discretion of the test director.

2.5 TEST WITNESSES

WHC shall provide a Level II or Level III non-destructive examination (NDE) Radiographer to witness specific parts of the acceptance testing. The Test Witness shall:

- Witness the tests.
- Review the results of the tests.
- Assist the Test Director as required.
- Sign the Test Execution and Approval Sheets when test has been performed.
- Sign any Exception Sheet(s) when exception has been resolved.

2.6 ACCEPTANCE CRITERIA

One section of this test is critical in relation to the safe operating envelope established for this equipment by 21 CFR Chapter 1 (April 1, 1991 Edition). Section 1020.40 establishes the maximum allowable radiation dose rate at a distance of 5 cm from the surface of the XRI cabinet. The maximum dose rate 5 cm from the surface of the XRI cabinet shall be verified to less than this limit in accordance with Section 5.1.1.

Section 5.12 defines the X-ray systems required penetration and resolution. The acceptance criteria is the radiographic visibility, on the systems display monitors of a 2T hole in an ASTM number 7 steel penetrometer through the sampler. A spacial resolution of 3.5 line pairs/mm must also be demonstrated on the monitors by imaging a standard converging line pairs plaque.

This test verifies basic operationing functions of the equipment. The acceptance criteria is based on the presence, individual operability and ability of the components of the equipment/system to operate in an integrated system as if it were being used in the field. Each step shall be evaluated and signed off by the cognizant engineer to verify that the equipment is acceptable for use.

R.P. WHC-SD-WM-ATP-157
REV 0

3.0 ATP EXCEPTIONS, CHANGE CONTROL AND DATA RECORDING INSTRUCTIONS

Throughout the procedure, spaces are provided for the test director's initials. Any exceptions (deviations from design requirements or stated operational limits) that arise during the test shall be recorded on an ATP Exception Sheet, and the exception number shall be noted next to the procedure step involved. Exception sheets are not needed for steps that are followed by rework or recovery instructions to perform ATP deviation resolutions. Exception resolutions may include troubleshooting and repair instructions. The resolution for each exception is subject to approval by the test director.

If the procedure requires modification due to test circumstances, the test director or designated representative may red-line the ATP record copy. The initials of the person making the change, and the date, shall be recorded next to the red line change. If necessary for clarity, the change may be described on an ATP exception sheet. QA approval is not needed on exception sheets that are used only to clarify red line procedure changes.

After the test is complete, the ATP Test Execution and Acceptance Sheet shall be completed as follows.

- 3.1 Check the applicable space on the ATP Test Execution and Acceptance Sheet indicating whether the ATP has been performed with exception or without exception.
- 3.2 The test performers shall sign and date the sheet in the spaces provided.
- 3.3 After the ATP execution section is completed, and all the exceptions have been resolved, the ATP Acceptance signatures shall be obtained.
- 3.4 A copy of the completed test shall be forwarded to the test director.
- 3.5 Corrected copies of the ATP and vendor drawings which incorporate all redlines is to be delivered as-built and complete prior to final acceptance.

4.0 TEST EQUIPMENT

- The vendor shall provide temporary wiring, power required for the operation of the equipment.
- The x-ray equipment will be warmed up according to the manufacturers procedures.

R.R. WHC-SD-WM-ATP-157
REV 0

SYSTEM NUMBER 2

- Calibrated radiation survey measuring equipment will be provided by the vendor.
- Any other prescribed equipment as designated by the test director.

~~11/30/95~~ ~~MANEARD~~ I.D. NO.

5.0 MOBILE XRI ACCEPTANCE TEST EXECUTION SECTION

40-64-6042

MOBILE X-RAY EXAMINATION SYSTEM IDENTIFICATION NUMBER 002

5.0.1

Before executing the XRI ATP, the test director and test operator will conduct a walk down of the system and inspect for general conformance to the design media (e.g. vendor drawings and equipment data sheets). Any non-conformance(s) must be recorded on an Exception Sheet and incorporated into an as-built document prior to final acceptance as outlined in section 3.5.

VERIFY that the focal spot of the X-ray tube is aligned with the centerline of the image intensifier.

VERIFY that the image intensifier lead mask aligned with the centerline of the image intensifier.

VERIFY that the sample duct lead mask aligned with the centerline of the image intensifier.

5.1 RADIATION LEAKAGE TEST

5.1.1

Verify that the maximum radiation level at any accessible point on the cabinets, 5 cm from the enclosure, is 0.5 mR/hr.

5.1.2

Record the following data from radiation survey meter:

Manufacture EBERLINE, R03B

Model R03B SN 7006

Calibration date 4-27-96 (EXPIRES)

5.2 SAFETY INTERLOCKS TEST

5.2.1

Verify that a key-actuated control is present.

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11-30-85 *[Signature]* 5.2.1.a

Verify that x-ray generation is not possible with the key removed.

11-30-85 *[Signature]* 5.2.2

Verify that all safety interlocks are functional and operate as required by the NDE representative.

11-30-85 *[Signature]* 5.2.3

Individually "trip" all safety interlocks and verify that it is not possible to re-energize the x-ray system with the interlock switch re-engaged.

11-30-85 *[Signature]* 5.2.4

Reset the x-ray system at the control console.

5.3 X-RAY MACHINE TEST

[Signature] 5.3.1

Locate the control, other than safety interlocks or main power control, to initiate and terminate the generation of x-rays.

[Signature] 5.3.2

Verify procurement specification of a fully operational highly stabilized (40K Hz. Power Supply) Philips MG 165/4.5 X-ray Machine (Tube MCN 165)

[Signature] 5.3.3

Confirm vendor or manufacturer measured focal spot sizes for both focal spots.

[Signature] 5.3.4

Verify the presence of a fixed X-ray tube head conical diaphragm to collimate the beam.

[Signature] 5.3.5

Activate the power and confirm at least a 20 second delay from the initiation of x-rays to the production of x-rays.

MG P41

[Signature] 5.3.5

Activate the power and confirm that both the X-ray focal spots are operational and generate X-rays for at least 2 minutes from the initiation of x-rays.

5.4 RADIATION GENERATION INDICATORS TEST

Power supply S/N A095 508 00026 Q1995

[Signature] 5.4.1

Identify at least two independent means which indicate when and only when x-rays are being generated. (One of the indicators required may be a milliammeter labeled to indicate x-ray tube current.)

[Signature] 5.4.2

Confirm that all other indicators are legibly labeled "X-RAY ON".

X-RAY COOLER CCN-33R "TURMOIL" S/N 2890-95

R.R. WHC-SD-WM-ATP-157
REV 0

James Miller 5.4.3
11/30/95
James Miller 5.4.4
11/30/95

Verify the other indicator(s) are visible from each door, access panel, and port; check that all warning lights are red.

Confirm that a blinking red light is present and illuminated on the exterior of the cabinet when and only when x-rays are being produced. This light is to be within 24 inches of the Cam-lock adaptor coupling.

5.5 RADIATION GENERATION DEVICE POSTING

James Miller 5.5.1
11/30/95
James Miller 5.5.2
"LABEL AT X-RAY
CONTROLLER"

Identify that the "Radiation Generating Device" sign is posted on all sides of the enclosure per ANSI N2.1 and N12.1.

Identify the permanently affixed or cabinet inscribed, location of any controls which can be used to initiate x-ray generation. Verify that all have a clearly legible and visible label bearing the statement:

"CAUTION: X-RAYS PRODUCED WHEN ENERGIZED"

5.6 MANUALS AND MSDS TEST

James Miller 5.6.1
11/30/95
James Miller 5.6.1.a
12/1/95
Kim Young 5.6.1.b
12-1-95
Kim Young 5.6.1.c
12-1-95
James Miller 5.6.2
11/30/95

Confirm that the operation or maintenance manual has the following technical and safety information:

Potential, current, and duty cycle of the X-ray equipment.

Any radiological safety procedures or precautions which may be necessary because of unique features of the system.

Schedule of maintenance necessary to keep the system in compliance with 21 CFR 1020.40 and ANSI 43.3.

Check Material Safety Data Sheets for information on all oils and cooling fluids.

Air conditioner SUVA *-"DUPONT"

X-ray cooler anti-freeze Volksman -Anti' Prod #547492

X-ray cooler refrigerant SUVA -"DUPONT"

Ref. WHC-SD-WM-ATP-157
REV 0

X-ray power supply/high voltage tank "SHELL" DIALAX*

5.7 X-RAY IMAGE INTENSIFIER TEST

[Signature] 5.7.1
11/30/95

Confirm the intensifier is a tri-field 9 inch image intensifier Thomson Model Th 9438 HX or equivalent.

Mfg. THOMSON / VSTECHNOLOGIES

Model No. TH 9438 HX

Serial No. 531698 R

[Signature] 5.7.2
11/30/95

Verify the vendor documents of image intensifier resolution measurement are:.

- a. Minimum of 5.0 line-pairs/mm in 215 mm mode.
- b. Minimum of 5.6 line-pairs/mm in 160 mm mode.
- c. Minimum of 6.8 line-pairs/mm in 120 mm mode.

[Signature] 5.7.3
11/30/95

Verify that the output image field size of 25 mm diameter.

5.8 X-RAY IMAGING CAMERA TEST

[Signature] 5.8.1
11/30/95

Confirm that the CCD camera has a minimum of 1100 horizontal and 450 vertical elements and a minimum of resolution of 850 TV lines.

Mfg. VSTECHNOLOGIES

Model No. VJ-111

Serial No. 380

[Signature] 5.8.2
11-30-95

Verify three modes of camera operation. A normal mode with 486 TV lines of resolution at an illumination of 13.6 lux. A low light mode with a vertical resolution of 350 lines at an illumination of 6.8 lux. An integrated mode where two fields are displayed from a single integrated image at a vertical resolution of 486 TV lines at 6.8 lux.

[Signature] 5.8.3
11/30/95

Confirm that the 10 to 110 mm, F-stop 1.6/1.8 motorized zoom lens with a motorized iris and focus controls are remotely located at the control console.

R-2.WHC-SD-WM-ATP-157
REV 0

Mfg. COMPUTAR

Model No. 11-110mm

Serial No. 125 664

5.9 X-RAY SHUTTERS TEST

John Miller 11/30/95 5.9.1 Verify that the two sets of four-way shutters operate independently of each other.

John Miller 11/30/95 5.9.2 Verify that each of the shutter leaves operates smoothly over the full travel/stroke.

5.10 X-RAY MANIPULATOR TEST

John Miller 11/30/95 5.10.1 Confirm that a remotely operated manipulator system for positioning image quality indicators and four standard samples is present.

5.11 X-RAY DISPLAY MONITORS TEST

John Miller 11/30/95 5.11.1 Confirm two, 13 inch monitors with a horizontal resolution of 1000 TV lines with a minimum of 10 shades of grey scale are present.

Monitor Mfg. ELECTROHOME

Model No. M1543/1743

Serial Nos. 1868A108 1868A107

EXCEPTION No. 1.

John Miller 12-1-95

5.12 X-RAY PENETRATION AND RESOLUTION TEST

John Miller 12/1/95 5.12.1 ~~Verify that ASTM number 7 plaque penetrameter's 2T hole is visible on the monitor when radiographed through the sample guide tube (approximately .372 inches of steel) with no image processing.~~

~~DELETE THIS TEST~~

John Miller 12-1-95 USES 5.12.2

Demonstrate spacial resolution of 3.5 line-pairs/mm on the display monitor without any image processing.

AS BASIS FOR ACCEPTANCE

5.13 X-RAY PRINTER TEST

John Miller 12/1/95 4.5 lp/mm at max magnification, IF-2X, F_{1/2} 0.4mm

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Jan Rukh 5.13.1
11/30/95

Demonstrate the hard copy printer has a print density of 300 dots per inch and a grey scale rendition of 128 gradations minimum.

Mfg. SEIKOSHA

Model No. VP-4500

Serial No. KM0501539

Confirm normal print size is approximately 6.0 X 8.0 inches.

Verify that the printer is capable of displaying multiple image segments.

Jan Rukh 5.13.2
11/30/95
Jan Rukh 5.13.3
11/30/95

5.14. X-RAY VIDEO RECORDER TEST

Jan Rukh 5.14.1
11/30/95

Confirm that a 1/2 inch S-VHS video cassette recorder with 400 lines of monochrome resolution has been provided.

Mfg. SONY

Model No. SVO-9500 MD

Serial No. 22674

5.14.2

Verify that the system is equipped for audio recording of inspection record narrative.

Exception #2
Delete this requirement
NOT USED
12/1/95

5.15 X-RAY IMAGE PROCESSOR TEST

Mfg. VJ TECHNOLOGIES

Model No. VJ-340

Serial No. T501010924 DATE OCT 85

Check the video text writer and pointer generator.

Verify background subtraction, image averaging, image accumulation and frozen image functions.

Jan Rukh 5.15.1
11/30/95
Jan Rukh 5.15.2
11/30/95

ReR. WHC-SD-WM-ATP-157
REV. 0

5.16 TRAILER CONSTRUCTION TEST

[Signature] 5.16.1
11/30/95

Obtain the following information:

<u>✓</u>	Hitch size and type	PINTEL TYPE
<u>✓</u>	Tongue weight marked	✓ gross wt 6000# light wt 1000#
<u>✓</u>	Safety chain size	1/2"

[Signature] 5.16.2
11/30/95

Verify the following are provided:

- Brake and stop-lights, turn-indicator lights.
- GVW permanently marked on trailer.
- Lift/Hoisting rigging points identified.
- Center-of-Gravity of assembly identified.

REPORTED IN MFG DATA

EXECUTION AND TEST APPROVAL SHEET

EXECUTORS

James M. Miller / CEE 11/30/95 Ken T. Smith / NDE 11-30-95
Director/Organization Date Operator/Organization Date
James M. Miller / CEE 11/30/95
Recorder/Organization Date

WITNESSES

Don Board QA 11-30-95 _____
Witness/Organization Date Witness/Organization Date
X James Carlson 11-30-95 _____
Witness/Organization Date Witness/Organization Date

TEST APPROVAL AND ACCEPTANCE

Westinghouse Hanford Company

Without exceptions _____ With exceptions resolved X With exceptions outstanding _____

M. L. McElroy - QA 12/4/95 James M. Miller CEE 12/4/95
(Title or Department) Date (Title or Department) Date

Ref. WHC-SD-WM-ATP-157
REV 0

EXCEPTION SHEET

EXCEPTION NUMBER:

1

DATE:

12/1/95

EXCEPTION:

~~PER~~ 5.12.1 VERIFY THAT ASTM No. 7
PLAQUE PENETRATOR'S 2T HOLE
" WITH NO IMAGE PROCESSING

PLANNED ACTION:

DELETE THIS REQUIREMENT
WITH CONCURRENCE OF TEST DIRECTOR
AND TEST OPERATOR

ACTION TAKEN:

DATE:

12/1/95

DELETE

EXCEPTION/RETEST APPROVAL:

Retest approved
and acceptedException
accepted as is
(Need details)☒ Other
(Need details)

Details:

THE SPACIAL RESOLUTION DEMONSTRATION
TEST IS A MORE SENSITIVE INDICATION
OF THE SYSTEM'S PERFORMANCE. (SEE PAGE 15A)

J. M. Miller 12/1/95

M. E. McElroy - QA 12/4/95

K. M. Young 12-1-95

Re-
WHC-SD-WM-ATP-157
REV 0

X-RAY SYSTEM OF 2

Normal II, MAXIMUM ZOOM

0.4mm focal spot

P&Q WHC-SD-WM-ATP-157
REV 0

EXCEPTION SHEET

EXCEPTION NUMBER: 2DATE: 12/1/95EXCEPTION: VERIFY THAT THE SYSTEM IS
EQUIPPED WITH AUDIO RECORDING...

PLANNED ACTION:

DELETE THIS REQUIREMENT

ACTION TAKEN:

DATE: 12/1/95DELETE

EXCEPTION/RETEST APPROVAL:

☐ Retest approved
and accepted☐ Exception
accepted as is
(Need details)☒ Other
(Need details)

Details:

THERE IS FAR TOO MUCH NOISE
FROM EQUIPMENT RUNNING IN
THAT PRENS FOR THIS TO BE
PRACTICAL OR REQUIRED

M.E. M'Garry - QA 12/4/95John P. Kline 12/1/95
Kim P. Kline 12-1-95

FINAL PRINTED MENU

SYSTEM No. 2 PRINTER MENU

CONTROL LIST(1.09)

GAIN	AUTO1
FILTER(LOW/COLOR)	MIDDLE/NONE
REVERSE	OFF
FILE No.	No.33
NOISE REDUCTION	1
CONTRAST & BRIGHTNESS	AUTO(14/+00)
EXPANSION(H)	X1
EXPANSION(U)	X2
TRIMMING(H)	0020 mm
LENGTH(H)	0215 mm
TRIMMING(U)	017 RASTERS
LENGTH(U)	0480 RASTERS
PAGE LENGTH	0215 mm
FRONT DISTANCE	000 mm
LEFT DISTANCE	000 mm
CUT MARK	OFF
ROTATION	PORTRAIT
PAPER SELECT	2
QUANTITY	01
SIGNAL TYPE	COMPOSITE VIDEO
SCANNING METHOD	INTERLACED
ODD/EVEN SELECT	1
--- V.SYNC PHASE	*****
SAMPLING CLOCK	INTERNAL
--- H.EXPANSION	024.4 MHz
--- CLOCK PHASE	*****
H.SYNC PHASE	OFF
SPEED & RESOLUTION	NORMAL NORMAL 256
CLOCK FREQUENCY	024.41 MHz
H.SYNC FREQUENCY	015.73 KHz
V.SYNC FREQUENCY	059.95 Hz
MULTI FORMAT	OFF
TERMINATION(REAR PANEL)	
--- R	TTL/ANALOG 75Ω ON
--- B	TTL/ANALOG 75Ω ON
--- G/VIDEO	HIGH
--- H.SYNC/C.SYNC	TTL 75Ω ON
--- V.SYNC	TTL 75Ω ON
--- EXT.CLK	TTL 75Ω ON

SYSTEM NO 2

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APPENDIX F

RELEASE TO OPERATE, XR1-003

**Westinghouse
Hanford Company****Internal
Memo**

From: Nondestructive Examination
Phone: 376-8061 L6-36
Date: December 6, 1995
Subject: INITIAL OPERATION APPROVAL FOR CORE SAMPLE X-RAY CART HO-64-6043
(UNIT #3).

To: J. R. Weber S7-12
cc: File/LB

The Core Sample X-ray Cart, HO-64-6043 (Unit #3) is approved for initial (normal) operation. This approval is based on the manufacturer building the system to the requirements of 21 CFR 1020.40 and ANSI N43.3. In addition Radiological Control has successfully completed an interlock functionality inspection, and has determined that all accessible areas are below .5 mR/hr at a distance of 5 cm.

Approved By:

J. K. Keve
NDE RGD Safety Officer

J. C. Krogness
NDE RGD Manager

D. R. Ekstrom
300 Area Radiological Control Manager

B. H. Christiansen
RGD SCE

APPENDIX G

RADIATION SURVEY REPORT(S), XR1-003

Survey No. N^o 224669

Page 1 of 2

F.C. J

Purpose of Survey (check appropriate box(es)):

Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill

Alarm Response: ☐ CAM, ☐ ARM(RAM), ☐ PSD

☐ HRA/VHRA Work ☒ Job Coverage ☐ Other

☐ Exposure Incident ☐ Material Release☐ RM Transfer/Shipment ☐ Required, Task No.

NIA _____ Map/Sketch

N/A

map/sketch

map/sketch

[illegible]

Continued on page 2

Air Sample Results (uCi/ml)				
	BZ	GA	Initial	Decay
A 1	N/A			
B 1				
A 2				
B 2				N/A

Legend

⑧ - Smear Location

 - Air Sample Location

[#] - Large Area Smear

📞 - Contact Reading

Other *NIA*

[illegible]

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APPENDIX H

HANFORD SITE ATP, XR1-003

ENGINEERING DATA TRANSMITTAL

1. EDT NO 613783

BD-7400-172-2 (04/94) GEF097

RELEASE AUTHORIZATION**Document Number:** WHC-SD-WM-ATR-157, REV 0**Document Title:** ATP for Core Sample X-Ray Systems 2, 3, and 4**Release Date:** 10/24/95

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:
Kara Broz
10/24/95

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SUPPORTING DOCUMENT

1. Total Pages 18

2. Title

ATP for Core Sample X-Ray Systems 2, 3, and 4.

3. Number

WHC-SD-WM-ATP-157

4. Rev No.

0

5. Key Words

Mobile, X-Ray, Test, Core, Sample, System

6. Author

Name: J. R. Weber

10-23-95

Signature

Organization/Charge Code 75230/N4H4E

7. Abstract

This ATP has been prepared to demonstrate that each of the mobile X-Ray Imaging (XRI) system will function as initiated by the Westinghouse Hanford Company (WHC) procurement requisition 428742 and all relevant alterations. This document was prepared in compliance with WHC-CM-6-1, Standard Engineering Practices, EP-4.2, Testing Practices.

8. RELEASE STAMP

OFFICIAL RELEASE

BY WHC

DATE OCT 24 1995

Sta. 4

Ref. WHC-SD-WM-ATP-157
REV 0

**MOBILE X-RAY IMAGING SYSTEM
ACCEPTANCE TEST PROCEDURE
FOR
PURCHASE ORDER NUMBER MDW-XDV-428742**

Author

J. R. Weber

Revised, WHC-SD-WM-ATP-157
REV 0

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REV 0

MOBILE X-RAY IMAGING SYSTEM
ACCEPTANCE TEST PROCEDURE
FOR
PURCHASE ORDER NUMBER MDW-XDV-428742

1.0 PURPOSE OF THE TEST

This Acceptance Test Procedure (ATP) has been prepared to demonstrate that each of the mobile X-Ray Imaging (XRI) systems will function as intended by the Westinghouse Hanford Company (WHC) procurement requisition 428742 and all relevant alterations. This document was prepared in compliance with WHC-CM-6-1, *Standard Engineering Practices*, EP-4.2, Testing Practices.

This document is related to the Acceptance Test Procedure WHC-SD-WM-ATP-133 which documents the tests performed on the "Prototype" Core-sample X-ray imaging system. For this reason, changes from the referenced ATP are shown in "red-line" text in this document. The test results will be issued as an Acceptance Test Report (ATR), WHC-SD-WM-ATR-157, after all testing is complete. The test will be performed at the vendor's facility prior to shipment to the Hanford Site and portions of the ATP will be re-run following shipment from the vendor to verify that no changes occurred in transit. This is specified in the contract documents.

1.1 SYSTEM DESCRIPTION

The XRI system is a mobile real-time radiographic system designed to safely examine radioactive tank core segments collected at the Hanford site. The mobile XRI System is designed to meet the requirements of 21 CFR 1020.40, ANSI N43.3, and applicable Washington State licensing requirements.

2.0 RESPONSIBILITIES

The test shall be performed by a test director from the WHC at the vendor facility. The test director shall be a person technically qualified and knowledgeable of the safety requirements associated with the testing.

Each company or organization participating in the conduct of this test will designate personnel to assume the responsibilities and duties as defined herein. The names shall be provided to the recorder for listing on the recorder's copy of the test execution sheet prior to the performance of any part of the test.

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2.1 TEST DIRECTOR

The WHC shall provide a test director to coordinate all acceptance testing. The Test Director shall:

- The test director is responsible for assuring that the test is performed in accordance with this document. The test director's duties include, but are not limited to: coordinating and oversight of test performance, signing or designating an authority to sign the completion of each indicated step and resolve exceptions to this test.
- The test director shall decide whether to continue the test after the discovery of an exception [See Section 3.0]. The test shall not continue without resolving and repairing a non-conformance unless the test director determines that the non-conformance will not jeopardize personnel or equipment.
- Confirm that field testing and inspection of the system or portion of the system to be tested has been completed.
- Stop any test which may pose any danger to personnel or cause damage to the system until the test procedure has been revised.
- Evaluate recorded data, discrepancies, and exceptions.
- Obtain from the design engineer any information or changes necessary to clear or resolve objections.
- Signs the Execution and Test Approval Sheet.
- Signs any Exception Sheets when any required retest has been executed and accepted.
- Obtain required signatures on the ATP master prior to reproduction and distribution.

2.2 TEST OPERATOR

The vendor shall provide a Test Operator. The Test Operator shall:

- Perform the test under the direction of the Test Director.
- Provide labor, equipment, and test instruments required for performing tests.

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- Confirm that all equipment required for performing tests will be available at the start of testing.
- Sign the Execution and Test Approval Sheet.

2.3 TEST RECORDER

A Test Recorder to record all acceptance testing will be provided. The Test Recorder shall:

- Prepare a field copy from the ATP Master.
- Record the names of all designated personnel on the Field copy of ATP prior to start of testing.
- Record test instrument identification numbers and calibration expiration dates as required.
- Initial and date every test step on the Field copy as it is completed.
- Record objections and exceptions on an Exception Sheet.
- Sign the Execution and Test Approval Sheet when Test has been performed.
- After test is completed, assign alpha numeric page numbers to any added Exception Sheets and records page numbers in the Table of Contents.
- Sign Exception Sheet(s) when exceptions have been resolved.
- Transfers Filed copy entries to the ATP Master in ink, signs, and dates. Transmits the Master to the Test Director for approval signature routing.

2.4 QUALITY ASSURANCE

The WHC Quality Assurance (QA) organization shall:

- Review and approve exception resolutions, and shall review and accept test results.
- Shall review and approve each exception; this approval may be obtained at the time the resolution is written OR QA approval may

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be postponed until a QA representative reviews the test results, following test completion, at the discretion of the test director.

2.5 TEST WITNESSES

WHC shall provide a Level II or Level III non-destructive examination (NDE) Radiographer to witness specific parts of the acceptance testing. The Test Witness shall:

- Witness the tests.
- Review the results of the tests.
- Assist the Test Director as required.
- Sign the Test Execution and Approval Sheets when test has been performed.
- Sign any Exception Sheet(s) when exception has been resolved.

2.6 ACCEPTANCE CRITERIA

One section of this test is critical in relation to the safe operating envelope established for this equipment by 21 CFR Chapter 1 (April 1, 1991 Edition). Section 1020.40 establishes the maximum allowable radiation dose rate at a distance of 5 cm from the surface of the XRI cabinet. The maximum dose rate 5 cm from the surface of the XRI cabinet shall be verified to less than this limit in accordance with Section 5.1.1.

Section 5.12 defines the X-ray systems required penetration and resolution. The acceptance criteria is the radiographic visibility, on the systems display monitors of a 2T hole in an ASTM number 7 steel penetrometer through the sampler. A spacial resolution of 3.5 line pairs/mm must also be demonstrated on the monitors by imaging a standard converging line pairs plaque.

This test verifies basic operationing functions of the equipment. The acceptance criteria is based on the presence, individual operability and ability of the components of the equipment/system to operate in an integrated system as if it were being used in the field. Each step shall be evaluated and signed off by the cognizant engineer to verify that the equipment is acceptable for use.

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3.0 ATP EXCEPTIONS, CHANGE CONTROL AND DATA RECORDING INSTRUCTIONS

Throughout the procedure, spaces are provided for the test director's initials. Any exceptions (deviations from design requirements or stated operational limits) that arise during the test shall be recorded on an ATP Exception Sheet, and the exception number shall be noted next to the procedure step involved. Exception sheets are not needed for steps that are followed by rework or recovery instructions to perform ATP deviation resolutions. Exception resolutions may include troubleshooting and repair instructions. The resolution for each exception is subject to approval by the test director.

If the procedure requires modification due to test circumstances, the test director or designated representative may red-line the ATP record copy. The initials of the person making the change, and the date, shall be recorded next to the red line change. If necessary for clarity, the change may be described on an ATP exception sheet. QA approval is not needed on exception sheets that are used only to clarify red line procedure changes.

After the test is complete, the ATP Test Execution and Acceptance Sheet shall be completed as follows.

- 3.1 Check the applicable space on the ATP Test Execution and Acceptance Sheet indicating whether the ATP has been performed with exception or without exception.
- 3.2 The test performers shall sign and date the sheet in the spaces provided.
- 3.3 After the ATP execution section is completed, and all the exceptions have been resolved, the ATP Acceptance signatures shall be obtained.
- 3.4 A copy of the completed test shall be forwarded to the test director.
- 3.5 Corrected copies of the ATP and vendor drawings which incorporate all redlines is to be delivered as-built and complete prior to final acceptance.

4.0 TEST EQUIPMENT

- The vendor shall provide temporary wiring, power required for the operation of the equipment.
- The x-ray equipment will be warmed up according to the manufacturers procedures.

R2, WHC-SD-WM-ATP-157
REV 0

HO-64-6043

- Calibrated radiation survey measuring equipment will be provided by the vendor.
- Any other prescribed equipment as designated by the test director.

WHC No. HO-64-6043

5.0 MOBILE XRI ACCEPTANCE TEST EXECUTION SECTION

MOBILE X-RAY EXAMINATION SYSTEM IDENTIFICATION NUMBER 003

12/5/95 5.0.1

Before executing the XRI ATP, the test director and test operator will conduct a walk down of the system and inspect for general conformance to the design media (e.g. vendor drawings and equipment data sheets). Any non-conformance(s) must be recorded on an Exception Sheet and incorporated into an as-built document prior to final acceptance as outlined in section 3.5.

12/5/95 5.0.2

VERIFY that the focal spot of the X-ray tube is aligned with the centerline of the image intensifier.

12/5/95 5.0.2

VERIFY that the image intensifier lead mask aligned with the centerline of the image intensifier.

12/5/95 5.0.2

VERIFY that the sample duct lead mask aligned with the centerline of the image intensifier.

5.1 RADIATION LEAKAGE TEST

12-5-95
T.F. Oreny 5.1.1

Verify that the maximum radiation level at any accessible point on the cabinets, 5 cm from the enclosure, is ≤ 0.5 mR/hr.
less than TR 12-5-95

12/5/95 5.1.2

Record the following data from radiation survey meter:

Manufacture ERERLINE

Model RO-3B S/N 6462

Calibration date CALIBRATED 8/2/95 EXPIRES 8/2/96

5.2 SAFETY INTERLOCKS TEST

12/5/95 5.2.1

Verify that a key-actuated control is present.

Ref. WHC-SD-WM-ATP-157
REV 0

James Miller 12/5/95
T.F. Chenev 12-5-95
Jim Young 12-5-95

5.2.1.a

Verify that x-ray generation is not possible with the key removed.

5.2.2

Verify that all safety interlocks are functional and operate as required by the NDE representative.

5.2.3

Individually "trip" all safety interlocks and verify that it is not possible to re-energize the x-ray system with the interlock switch re-engaged.

5.2.4

Reset the x-ray system at the control console.

5.3 X-RAY MACHINE TEST

Jim Young 12-5-95
5.3.1

Locate the control, other than safety interlocks or main power control, to initiate and terminate the generation of x-rays.

5.3.2

Verify procurement specification of a fully operational highly stabilized (40K Hz. Power Supply) Philips MG 165/4.5 X-ray Machine

5.3.3

Confirm vendor or manufacturer measured focal spot sizes for both focal spots. *MFG DATA*

5.3.4

Verify the presence of a fixed X-ray tube head conical diaphragm to collimate the beam. *0.65" Ø*

5.3.5

Activate the power and confirm at least a 20 second delay from the initiation of x-rays to the production of x-rays. *21 SECONDS*

5.3.5

Activate the power and confirm that both the X-ray focal spots are operational and generate X-rays for at least 2 minutes from the initiation of x-rays.

5.4 RADIATION GENERATION INDICATORS TEST

5.4.1

Identify at least two independent means which indicate when and only when x-rays are being generated. (One of the indicators required may be a milliammeter labeled to indicate x-ray tube current.)

5.4.2

Confirm that all other indicators are legibly labeled "X-RAY ON".

R&R WHC-SD-WM-ATP-157
REV 012/6/95
5.4.312-5-95
5.4.4

Verify the other indicator(s) are visible from each door, access panel, and port; check that all warning lights are red.

Confirm that a blinking red light is present and illuminated on the exterior of the cabinet when and only when x-rays are being produced. This light is to be within 24 inches of the Cam-lock adaptor coupling.

28
5.5 RADIATION GENERATION DEVICE POSTING12/6/95
5.5.112-5-95
5.5.2

Identify that the "Radiation Generating Device" sign is posted on all sides of the enclosure per ANSI N2.1 and N12.1.

Identify the permanently affixed or cabinet inscribed, location of any controls which can be used to initiate x-ray generation. Verify that all have a clearly legible and visible label bearing the statement:

"CAUTION: X-RAYS PRODUCED WHEN ENERGIZED"

5.6 MANUALS AND MSDS TEST

12/6/95
5.6.112/6/95
5.6.1.a12/6/95
5.6.1.b12/6/95
5.6.1.c12/6/95
5.6.2

Confirm that the operation or maintenance manual has the following technical and safety information:

Potential, current, and duty cycle of the X-ray equipment.

Any radiological safety procedures or precautions which may be necessary because of unique features of the system.

Schedule of maintenance necessary to keep the system in compliance with 21 CFR 1020.40 and ANSI 43.3.

Check Material Safety Data Sheets for information on all oils and cooling fluids.

Air conditioner ✓

X-ray cooler anti-freeze ✓

X-ray cooler refrigerant L

Re WHC-SD-WM-ATP-157
REV 0

X-ray power supply/high voltage tank ✓

5.7 X-RAY IMAGE INTENSIFIER TEST

James Miller 12/6/95
5.7.1

Confirm the intensifier is a tri-field 9 inch image intensifier Thomson Model Th 9438 HX or equivalent.

Mfg. VJ TECHNOLOGIES (Thomson)

Model No. VJ-900-HX

Serial No. 550088

James Miller 12/6/95
5.7.2

Verify the vendor documents of image intensifier resolution measurement are:

- a. Minimum of 5.0 line-pairs/mm in 215 mm mode.
- b. Minimum of 5.6 line-pairs/mm in 160 mm mode.
- c. Minimum of 6.8 line-pairs/mm in 120 mm mode.

James Miller 12/6/95
5.7.3

Verify that the output image field size of 25 mm diameter.

5.8 X-RAY IMAGING CAMERA TEST

James Miller 12/5/95
5.8.1

Confirm that the CCD camera has a minimum of 1100 horizontal and 450 vertical elements and a minimum of resolution of 850 TV lines.

Mfg. VJ TECHNOLOGIES

Model No. VJ-111

Serial No. 378

Exception #3

CHANGED FROM VJ-111-380
VJ-111-380 IS IN SYSTEM #002

James Anderson 12/5/95
5.8.2

Verify three modes of camera operation. A normal mode with 486 TV lines of resolution at an illumination of 13.6 lux. A low light mode with a vertical resolution of 350 lines at an illumination of 6.8 lux. An integrated mode where two fields are displayed from a single integrated image at a vertical resolution of 486 TV lines at 6.8 lux.

James Anderson 12/5/95
5.8.3

Confirm that the 10 to 110 mm, F-stop 1.6/1.8 motorized zoom lens with a motorized iris and focus controls are remotely located at the control console.

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Mfg. Computer
Model No. 11-1100001
Serial No. NA

5.9 X-RAY SHUTTERS TEST

James Miller 12/5/95
5.9.1

Verify that the two sets of four-way shutters operate independently of each other.

James Miller 12/5/95
5.9.2

Verify that each of the shutter leaves operates smoothly over the full travel/stroke.

5.10 X-RAY MANIPULATOR TEST

James Miller 12/5/95
5.10.1

Confirm that a remotely operated manipulator system for positioning image quality indicators and four standard samples is present.

5.11 X-RAY DISPLAY MONITORS TEST

James Miller 12/5/95
5.11.1

Confirm two, ¹⁵/₁₂ inch monitors with a horizontal resolution of 1000 TV lines with a minimum of 10 shades of grey scale are present.

Monitor Mfg. ELECTROHOME

Model No. 38-V4330A-A

Serial Nos. 03241A116 18682A101

Exception 1 DELETE!

5.12 X-RAY PENETRATION AND RESOLUTION TEST

James Miller 12/5/95
5.12.1

Verify that ASTM number 7 plaque penetrameter's 2T hole is visible on the monitor when radiographed through the sample guide tube (approximately .372 inches of steel) with no image processing.

James Miller 12/5/95

James Miller 12/5/95
5.12.2

Demonstrate spacial resolution of 3.5 line-pairs/mm on the display monitor without any image processing.

5.13 X-RAY PRINTER TEST

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Demonstrate the hard copy printer has a print density of 300 dots per inch and a grey scale rendition of 128 gradations minimum.

Mfg. SEIKOSHA

Model No. VP-4500

Serial No. KM0501546

Confirm normal print size is approximately 6.0 X 8.0 inches.

Verify that the printer is capable of displaying multiple image segments.

5.14 X-RAY VIDEO RECORDER TEST

Confirm that a 1/2 inch S-VHS video cassette recorder with 400 lines of monochrome resolution has been provided.

Mfg. SONY

Model No. SV0 9500 MD

Serial No. N/A

THE RECORDER IS FROM SYSTEM No. 1

Verify that the system is equipped for audio recording of inspection record narrative.

5.15 X-RAY IMAGE PROCESSOR TEST

Mfg. VI TECHNOLOGIES

Model No. VF340

Serial No. T-501010666

Check the video text writer and pointer generator.

Verify background subtraction, image averaging, image accumulation and frozen image functions.

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REV 0

5.16 TRAILER CONSTRUCTION TEST

Jon Miller 5.16.1 12/6/95

Obtain the following information:

Prater

Hitch size and type

✓

Tongue weight marked

✓

Safety chain size

Jon Miller 5.16.2 12/6/95

Verify the following are provided:

- Brake and stop-lights, turn-indicator lights.
- GVW permanently marked on trailer.
- Lift/Hoisting rigging points identified.
- Center-of-Gravity of assembly identified.

R&R WHC-SD-WM-ATP-157
REV 0

EXCEPTION SHEET

EXCEPTION NUMBER: 1DATE: 12/6/95EXCEPTION: S.12.1 VERIFY ASTM No. 7 PLAQUE
PENTAMETER 2T HOLE ETC

PLANNED ACTION:

DELETE THIS REQUIREMENT WITH
CONCURRENCE OF TEST DIRECTOR AND
TEST OPERATOR

ACTION TAKEN:

DATE: 12/6/95

DELETED

* See Execution and Test Approval Sheet

EXCEPTION/RETEST APPROVAL:

☐ Retest approved
and accepted☐ Exception
accepted as is
(Need details)☒ Other
(Need details)Details: REFERENCE SAME PARAGRAPH ON
ATP SYSTEM NO-64-4062. 12/6/95
6042THE SPECIAL RESOLUTION WITH THE
CONVERGING LINE PAIR GAUGE IS A MORE
SENSITIVE MEASURE OF THE SYSTEMS
PERFORMANCE

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R2. WHC-SD-WM-ATP-157
REV 0

EXCEPTION SHEET

EXCEPTION NUMBER: 2DATE: 12/6/95

EXCEPTION:

~~VERIFY~~ 5.4.2 VERIFY THAT THE
SYSTEM IS EQUIPPED WITH AUDIO
RECORDING

PLANNED ACTION:

DELETE THIS REQUIREMENT

ACTION TAKEN:

DATE: 12/6/95

DELETED

* See Execution and Test Approval Sheet

EXCEPTION/RETEST APPROVAL:

☐ Retest approved
and accepted☐ Exception
accepted as is
(Need details)☒ Other
(Need details)Details: SEE ATP ON SYSTEM NO. NO-64-00620R/1
6042 1/8Too much noise from equipment
running in tank farms for this to
be practical!

Page 15 16

R.R. WHC-SD-WM-ATP-157
REV 0

EXCEPTION SHEET

EXCEPTION NUMBER: 2DATE: 12/6/95EXCEPTION: CHANGE NOTED FROM THE
WHC FACTORY ATP ON THIS UNIT

PLANNED ACTION:

NONE

ACTION TAKEN:

DATE: 12/6/95

* See Execution and Test Approval Sheet

EXCEPTION/RETEST APPROVAL:

 Retest approved
and accepted Exception
accepted as is
(Need details) X Other
(Need details)

Details:

NOTE OF RECORD!!
 THE FOCUS CONTROL WAS "JERRY" WHEN
 TESTED THE CAMERA AND MOST LIKELY THE
 10-110 ZOOM LENS WERE INTERCHANGED
 AT THE FACT VENDOR'S FACILITY. ~~B~~ CAMERAS
 AND LENS ON BOTH UNITS ARE FULLY FUNCTIONAL
 R/6/95

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H-21

* John I. Kue

1-24-96

John I. Kue 1-24-96

REL, WHC-SD-WM-ATP-157
REV 0

EXECUTION AND TEST APPROVAL SHEET

EXECUTORS

<u>J.R. WEBER</u>	<u>12/6/95</u>	<u>Robert M. Javit</u> NDE	<u>12-5-95</u>
Director/Organization	Date	Operator/Organization	Date
<u>Alan Andersen</u>	<u>12/6/95</u>	<u>T.F. Cheney</u> HPT	<u>12-5-95</u>
Recorder/Organization	Date		

*NOTE: During the revision of the exceptions, it was identified that the NDE Level 3 needed to approve the appropriate test step modifications.

WITNESSES

<u>T.F. Cheney</u> / Radiological Controls	<u>12-5-95</u>	* <u>John T. Lunde</u> NDE	<u>1-24-96</u>
Witness/Organization	Date	Witness/Organization	Date
<u>Alan Andersen</u> NDE	<u>12/6/95</u>		
Witness/Organization	Date	Witness/Organization	Date

TEST APPROVAL AND ACCEPTANCE

Westinghouse Hanford Company

Without exceptions _____ With exceptions resolved X With exceptions outstanding _____

<u>J.R. WEBER</u> CEE	<u>12/6/95</u>	<u>Don Boardman</u> QC/CPE	<u>12/6/95</u>
(Title or Department)	Date	(Title or Department)	Date

12/5/95

System 003

Printer Menu

CONTROL LIST(1.09)

GAIN	AUTO1
FILTER(LOW/COLOR)	MIDDLE/NONE
REVERSE	OFF
FILE No.	No.00
NOISE REDUCTION	1
CONTRAST & BRIGHTNESS	MANUAL(14/+00)
EXPANSION(H)	X1
EXPANSION(U)	X2
TRIMMING(H)	0020 mm
LENGTH(H)	0215 mm
TRIMMING(U)	017 RASTERS
LENGTH(U)	0480 RASTERS
PAGE LENGTH	0215 mm
FRONT DISTANCE	000 mm
LEFT DISTANCE	000 mm
CUT MARK	OFF
ROTATION	PORTRAIT
PAPER SELECT	2
QUANTITY	01
SIGNAL TYPE	COMPOSITE VIDEO
SCANNING METHOD	INTERLACED
ODD/EVEN SELECT	1
--- V.SYNC PHASE	*****
SAMPLING CLOCK	INTERNAL
--- H.EXPANSION	024.4 MHz
--- CLOCK PHASE	*****
H.SYNC PHASE	OFF
SPEED & RESOLUTION	NORMAL NORMAL 256
CLOCK FREQUENCY	024.37 MHz
H.SYNC FREQUENCY	015.73 KHz
V.SYNC FREQUENCY	059.93 Hz
MULTI FORMAT	OFF
TERMINATION(REAR PANEL)	
--- R	TTL/ANALOG 75Ω ON
--- B	TTL/ANALOG 75Ω ON
--- G/VIDEO	TTL/ANALOG 75Ω ON
--- H.SYNC/C.SYNC	TTL 75Ω ON
--- V.SYNC	TTL 75Ω ON
--- EXT.CLK	TTL 75Ω ON

wrong

System 003

12/6/95

CONTROL LIST(1.09)

GAIN	AUTO1
FILTER(LOW/COLOR)	MIDDLE/NONE
REVERSE	OFF
FILE No.	No.33 ✓
NOISE REDUCTION	1
CONTRAST & BRIGHTNESS	AUTO(14/+00)
EXPANSION(H)	X1
EXPANSION(U)	X2
TRIMMING(H)	0020 mm
LENGTH(H)	0215 mm
TRIMMING(U)	017 RASTERS
LENGTH(U)	0480 RASTERS
PAGE LENGTH	0215 mm
FRONT DISTANCE	000 mm
LEFT DISTANCE	000 mm
CUT MARK	OFF
ROTATION	PORTRAIT
PAPER SELECT	2
QUANTITY	01
SIGNAL TYPE	COMPOSITE VIDEO
SCANNING METHOD	INTERLACED
ODD/EVEN SELECT	1
--- V.SYNC PHASE	*****
SAMPLING CLOCK	INTERNAL
--- H.EXPANSION	024.4 MHz
--- CLOCK PHASE	*****
H.SYNC PHASE	OFF
SPEED & RESOLUTION	NORMAL NORMAL 256
CLOCK FREQUENCY	024.40 MHz
H.SYNC FREQUENCY	015.73 KHz
U.SYNC FREQUENCY	059.93 Hz
MULTI FORMAT	OFF

TERMINATION(REAR PANEL)

--- R	TTL/ANALOG 75Ω ON
--- B	TTL/ANALOG 75Ω ON
--- G/VIDEO	<u>TTL/ANALOG 75Ω ON</u>
--- H.SYNC/C.SYNC	TTL 75Ω ON
--- U.SYNC	TTL 75Ω ON
--- EXT.CLK	TTL 75Ω ON

APPENDIX I

RELEASE TO OPERATE, XR1-004

**Westinghouse
Hanford Company****Internal
Memo**

From: Nondestructive Examination
Phone: 376-8061 L6-36
Date: December 28, 1995
Subject: INITIAL OPERATION APPROVAL FOR CORE SAMPLE X-RAY CART HO-64-6044
(UNIT #4).

To: J. R. Weber S7-12
cc: File/LB

The Core Sample X-ray Cart, HO-64-6044 (Unit #4) is approved for initial (normal) operation. This approval is based on the manufacturer building the system to the requirements of 21 CFR 1020.40 and ANSI N43.3. In addition Radiological Control has successfully completed an interlock functionality inspection, and has determined that all accessible areas are below .5 mR/hr at a distance of 5 cm.

Approved By:

J. K. Keve
NDE RGD Safety Officer

J. C. Krogness
NDE RGD Manager

D. R. Ekstrom
300 Area Radiological Control Manager

B. H. Christiansen
RGD SCE

APPENDIX J

RADIATION SURVEY REPORT(S), XR1-004

[illegible]

[illegible]

Comments

With the machine (x-ray) running at full power a complete survey was done on the enclosure's accessible surfaces.

All interlocks were tested and okayed.

Samples Counted with portable instruments for N/A minutes.

Instr./Probe Model	RO-3B (CP)	E-140/Panceke (GM/Probe)				
Serial No.	6462	1289/414			N	
Efficiency	1	.1			A 12.25	
Correction Factor	1	10				

ADDITIONAL REPORTS

RPR No. N/A Sample Counter Log(s) N/A
RSR No. A ... Contamination - Skin N/A Procedure: WHC-IP-0718
... Contamination - Clothing N/A Other(s) N/A 3.1.4

HR Payroll No.: 6B678 Name (Print): RP French Signature: RP French

First-Line HP Manager: Date: 12/28/95 Payroll No.: 6A783 Name (Print): D. R. EKSTROM Signature: D. R. Ekstrom

Westinghouse Hanford Company - Radiological Control RADIOLOGICAL SURVEY REPORT				Survey No. Nº 234012						
Date 1.3.96	Time 1300	RWP No.(s) R-107/002	Page 1 of 2							
Area/Bldg./Room/Location (Code) 300-306F - Hi Bay				F.C. R						
Job Description Interlock inspection 7 survey of XRI #004-HO-64- 6044 - RGD at 160KV and 18.75 mamp after main - test done by qualified operator			Purpose of Survey (check appropriate box(es)) Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill Alarm Response: ☐ CAM, ☐ ARM(RAM), ☐ PSD ☐ HRA/VHRA Work ☒ Job Coverage ☐ Other ☐ Exposure Incident ☐ Material Release ☐ RM Transfer/Shipment ☐ Required, Task No.							
Map/Sketch NA			NA							
WESTINGHOUSE HANFORD COMPANY SEMI-ANNUAL RADIATION SURVEY AND INSPECTION COMPLETED DATE SURVEYED 7-6-95 EXPIRATION DATE 12-31-95 RADIATION SURVEY REPORT NO. 194779 MACHINE I.D. 601 INSPECTED BY Prigun, Dave RESURVEY REQUIRED IF MODIFICATIONS OR SHIELDING CHANGES ARE MADE. BL-6000-236 (09/88)			WESTINGHOUSE HANFORD COMPANY SEMI-ANNUAL RADIATION SURVEY AND INSPECTION COMPLETED DATE SURVEYED 7-6-95 EXPIRATION DATE 12-31-95 RADIATION SURVEY REPORT NO. 194779 MACHINE I.D. 333 INSPECTED BY Prigun, Dave RESURVEY REQUIRED IF MODIFICATIONS OR SHIELDING CHANGES ARE MADE. BL-6000-236 (09/88)							
NA			NA							
No.	Description	Dist.	DOSE RATE			CONTAMINATION LEVELS				
			β (non-pen) mrad/h	γ (pen) mR/h	η mrem/h	Direct (dpm/probe)		Smear (/100cm ²)		
						β	α	β (dpm)	α (dpm)	mrad/h
1	Beams and/or leakage from XRI-#004-HO-64-6044	C	<0.5	<0.5	—	20K/4.2		—	—	—
		50K	<0.5	<0.5	—	—		—	—	—
		—	—	—	—	—		—	—	—
NA										
NA										

Continued on page 2

Air Sample Results (μ Ci/ml)				Legend	
BZ	GA	Initial	Decay	☒ - Smear Location	☒ - Air Sample Location
α 1				☒ - Large Area Smear	* - Contact Reading
β 1				Other _____	
α 2					
12/4					

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APPENDIX K

HANFORD SITE ATP, XR1-004

Sta. 4 (3)

WHC-SD-WM-ATR-157 Rev. 0

OCT 24 1995

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT NO 613783

2. To: (Receiving Organization) Characterization Equipment Development (75220)		3. From: (Originating Organization) Characterization Equipment Design (75230)		4. Related EDT No.: 611321	
5. Proj./Prog./Dept./Div.: <i>N4H4E</i> Characterization Project		6. Cog. Engr.: J. R. Weber		7. Purchase Order No.: MDW-XDV-428742	
8. Originator Remarks: The attached supporting document WHC-SD-WM-ATP-157, Rev. 0, is the Acceptance Test Procedure for core sample X-Ray Imaging Systems number 2, 3, and 4.				9. Equip./Component No.: N/A	
				10. System/Bldg./Facility: N/A	
				12. Major Assm. Dwg. No.: N/A	
11. Receiver Remarks: N/A				13. Permit/Permit Application No.: N/A	
				14. Required Response Date: ASAP	

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-WM-ATP-157		0	ATP for Core Sample X-Ray Systems 2, 3, and 4	Q	1/2	1	1

16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec. 12.7)		1. Approval	4. Review	1. Approved	4. Reviewed no/comment
		2. Release	5. Post-Review	2. Approved w/comment	5. Reviewed w/comment
		3. Information	6. Dist. (Receipt Acknow. Required)	3. Disapproved w/comment	6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)									
(G)	(H)	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN
1/2	1/1	Cog. Eng. J. R. Weber	<i>[Signature]</i>	10/20/95	57-12	TREASURY	<i>[Signature]</i>	10/20/95	
1/2	1	Cog. Mgr. D. W. Hamilton	<i>[Signature]</i>	10/20/95	57-12				
1	1	QA D. C. Board	<i>[Signature]</i>	10/20/95	57-07				
		Safety							
		Env.							
1/2	1	CED Mgr. C. E. Hanson	<i>[Signature]</i>	10/20/95	H5-09				
		Central Files	<i>[Signature]</i>	10/20/95					

18. Signature of EDT Originator <i>[Signature]</i> Date <i>10/20/95</i>		19. Authorized Representative for Receiving Organization C. E. Hanson <i>[Signature]</i> Date <i>10/20/95</i>		20. Cognizant Manager D. W. Hamilton <i>[Signature]</i> Date <i>10/20/95</i>		21. DOE APPROVAL (if required) Ctrl. No. [] Approved [] Approved w/comments [] Disapproved w/comments	
---	--	--	--	---	--	--	--

RELEASE AUTHORIZATION**Document Number:** WHC-SD-WM-ATP-157, REV 0**Document Title:** ATP for Core Sample X-Ray Systems 2, 3, and 4**Release Date:** 10/24/95

This document was reviewed following the
procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:
Kara Broz
10/24/95

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SUPPORTING DOCUMENT		1. Total Pages 18
2. Title ATP for Core Sample X-Ray Systems 2, 3, and 4.	3. Number WHC-SD-WM-ATP-157	4. Rev No. 0
5. Key Words Mobile, X-Ray, Test, Core, Sample, System	6. Author Name: J. R. Weber 10-23-95 <i>[Signature]</i> Signature Organization/Charge Code 75230/N4H4E	
7. Abstract <p>This ATP has been prepared to demonstrate that each of the mobile X-Ray Imaging (XRI) system will function as initiated by the Westinghouse Hanford Company (WHC) procurement requisition 428742 and all relevant alterations. This document was prepared in compliance with WHC-CM-6-1, Standard Engineering Practices, EP-4.2, Testing Practices.</p>		
		8. RELEASE STAMP <div style="border: 1px solid black; padding: 5px; width: fit-content;"> OFFICIAL RELEASE BY VVO DATE OCT 24 1995 <i>Sta 4</i> </div>

Ref. WHC-SD-WM-ATP-157
REV 0

**MOBILE X-RAY IMAGING SYSTEM
ACCEPTANCE TEST PROCEDURE
FOR
PURCHASE ORDER NUMBER MDW-XDV-428742**

Author

J. R. Weber

Ref. WHC-SD-WM-ATP-157
REV 0

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Ref. WHC-SD-WM-ATP-157
REV 0

MOBILE X-RAY IMAGING SYSTEM
ACCEPTANCE TEST PROCEDURE
FOR
PURCHASE ORDER NUMBER MDW-XDV-428742

1.0 PURPOSE OF THE TEST

This Acceptance Test Procedure (ATP) has been prepared to demonstrate that each of the mobile X-Ray Imaging (XRI) systems will function as intended by the Westinghouse Hanford Company (WHC) procurement requisition 428742 and all relevant alterations. This document was prepared in compliance with WHC-CM-6-1, *Standard Engineering Practices*, EP-4.2, Testing Practices.

This document is related to the Acceptance Test Procedure WHC-SD-WM-ATP-133 which documents the tests performed on the "Prototype" Core-sample X-ray imaging system. For this reason, changes from the referenced ATP are shown in "red-line" text in this document. The test results will be issued as an Acceptance Test Report (ATR), WHC-SD-WM-ATR-157, after all testing is complete. The test will be performed at the vendor's facility prior to shipment to the Hanford Site and portions of the ATP will be re-run following shipment from the vendor to verify that no changes occurred in transit. This is specified in the contract documents.

1.1 SYSTEM DESCRIPTION

The XRI system is a mobile real-time radiographic system designed to safely examine radioactive tank core segments collected at the Hanford site. The mobile XRI System is designed to meet the requirements of 21 CFR 1020.40, ANSI N43.3, and applicable Washington State licensing requirements.

2.0 RESPONSIBILITIES

The test shall be performed by a test director from the WHC at the vendor facility. The test director shall be a person technically qualified and knowledgeable of the safety requirements associated with the testing.

Each company or organization participating in the conduct of this test will designate personnel to assume the responsibilities and duties as defined herein. The names shall be provided to the recorder for listing on the recorder's copy of the test execution sheet prior to the performance of any part of the test.

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2.1 TEST DIRECTOR

The WHC shall provide a test director to coordinate all acceptance testing. The Test Director shall:

- The test director is responsible for assuring that the test is performed in accordance with this document. The test director's duties include, but are not limited to: coordinating and oversight of test performance, signing or designating an authority to sign the completion of each indicated step and resolve exceptions to this test.
- The test director shall decide whether to continue the test after the discovery of an exception [See Section 3.0]. The test shall not continue without resolving and repairing a non-conformance unless the test director determines that the non-conformance will not jeopardize personnel or equipment.
- Confirm that field testing and inspection of the system or portion of the system to be tested has been completed.
- Stop any test which may pose any danger to personnel or cause damage to the system until the test procedure has been revised.
- Evaluate recorded data, discrepancies, and exceptions.
- Obtain from the design engineer any information or changes necessary to clear or resolve objections.
- Signs the Execution and Test Approval Sheet.
- Signs any Exception Sheets when any required retest has been executed and accepted.
- Obtain required signatures on the ATP master prior to reproduction and distribution.

2.2 TEST OPERATOR

The vendor shall provide a Test Operator. The Test Operator shall:

- Perform the test under the direction of the Test Director.
- Provide labor, equipment, and test instruments required for performing tests.

- Confirm that all equipment required for performing tests will be available at the start of testing.
- Sign the Execution and Test Approval Sheet.

2.3 TEST RECORDER

A Test Recorder to record all acceptance testing will be provided. The Test Recorder shall:

- Prepare a field copy from the ATP Master.
- Record the names of all designated personnel on the Field copy of ATP prior to start of testing.
- Record test instrument identification numbers and calibration expiration dates as required.
- Initial and date every test step on the Field copy as it is completed.
- Record objections and exceptions on an Exception Sheet.
- Sign the Execution and Test Approval Sheet when Test has been performed.
- After test is completed, assign alpha numeric page numbers to any added Exception Sheets and records page numbers in the Table of Contents.
- Sign Exception Sheet(s) when exceptions have been resolved.
- Transfers Filed copy entries to the ATP Master in ink, signs, and dates. Transmits the Master to the Test Director for approval signature routing.

2.4 QUALITY ASSURANCE

The WHC Quality Assurance (QA) organization shall:

- Review and approve exception resolutions, and shall review and accept test results.
- Shall review and approve each exception; this approval may be obtained at the time the resolution is written OR QA approval may

be postponed until a QA representative reviews the test results, following test completion, at the discretion of the test director.

2.5 TEST WITNESSES

WHC shall provide a Level II or Level III non-destructive examination (NDE) Radiographer to witness specific parts of the acceptance testing. The Test Witness shall:

- Witness the tests.
- Review the results of the tests.
- Assist the Test Director as required.
- Sign the Test Execution and Approval Sheets when test has been performed.
- Sign any Exception Sheet(s) when exception has been resolved.

2.6 ACCEPTANCE CRITERIA

One section of this test is critical in relation to the safe operating envelope established for this equipment by 21 CFR Chapter 1 (April 1, 1991 Edition). Section 1020.40 establishes the maximum allowable radiation dose rate at a distance of 5 cm from the surface of the XRI cabinet. The maximum dose rate 5 cm from the surface of the XRI cabinet shall be verified to less than this limit in accordance with Section 5.1.1.

Section 5.12 defines the X-ray systems required penetration and resolution. The acceptance criteria is the radiographic visibility, on the systems display monitors of a 2T hole in an ASTM number 7 steel penetrometer through the sampler. A spacial resolution of 3.5 line pairs/mm must also be demonstrated on the monitors by imaging a standard converging line pairs plaque.

This test verifies basic operationing functions of the equipment. The acceptance criteria is based on the presence, individual operability and ability of the components of the equipment/system to operate in an integrated system as if it were being used in the field. Each step shall be evaluated and signed off by the cognizant engineer to verify that the equipment is acceptable for use.

3.0 ATP EXCEPTIONS, CHANGE CONTROL AND DATA RECORDING INSTRUCTIONS

Throughout the procedure, spaces are provided for the test director's initials. Any exceptions (deviations from design requirements or stated operational limits) that arise during the test shall be recorded on an ATP Exception Sheet, and the exception number shall be noted next to the procedure step involved. Exception sheets are not needed for steps that are followed by rework or recovery instructions to perform ATP deviation resolutions. Exception resolutions may include troubleshooting and repair instructions. The resolution for each exception is subject to approval by the test director.

If the procedure requires modification due to test circumstances, the test director or designated representative may red-line the ATP record copy. The initials of the person making the change, and the date, shall be recorded next to the red line change. If necessary for clarity, the change may be described on an ATP exception sheet. QA approval is not needed on exception sheets that are used only to clarify red line procedure changes.

After the test is complete, the ATP Test Execution and Acceptance Sheet shall be completed as follows.

- 3.1 Check the applicable space on the ATP Test Execution and Acceptance Sheet indicating whether the ATP has been performed with exception or without exception.
- 3.2 The test performers shall sign and date the sheet in the spaces provided.
- 3.3 After the ATP execution section is completed, and all the exceptions have been resolved, the ATP Acceptance signatures shall be obtained.
- 3.4 A copy of the completed test shall be forwarded to the test director.
- 3.5 Corrected copies of the ATP and vendor drawings which incorporate all redlines is to be delivered as-built and complete prior to final acceptance.

4.0 TEST EQUIPMENT

- The vendor shall provide temporary wiring, power required for the operation of the equipment.
- The x-ray equipment will be warmed up according to the manufacturers procedures.

DECEMBER 27, 95

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- Calibrated radiation survey measuring equipment will be provided by the vendor.
- Any other prescribed equipment as designated by the test director.

40-64-6094

5.0 MOBILE XRI ACCEPTANCE TEST EXECUTION SECTION

MOBILE X-RAY EXAMINATION SYSTEM IDENTIFICATION NUMBER

SYSTEM 004

James Miller 12/27/95
5.0.1

Before executing the XRI ATP, the test director and test operator will conduct a walk down of the system and inspect for general conformance to the design media (e.g. vendor drawings and equipment data sheets). Any non-conformance(s) must be recorded on an Exception Sheet and incorporated into an as-built document prior to final acceptance as outlined in section 3.5.

James Miller 12/27/95
5.0.2
925'

VERIFY that the focal spot of the X-ray tube is aligned with the centerline of the image intensifier.

James Miller 12/27/95
5.0.2
James Miller 12/27/95
5.0.2
12/27/95

VERIFY that the image intensifier lead mask aligned with the centerline of the image intensifier.

VERIFY that the sample duct lead mask aligned with the centerline of the image intensifier.

5.1 RADIATION LEAKAGE TEST

Bob French 12/27/95
5.1.1

Verify that the maximum radiation level at any accessible point on the cabinets, 5 cm from the enclosure, is 0.5 mR/hr.

James Miller 12-27-95
5.1.2

Record the following data from radiation survey meter:

Manufacture GERLIVE

Model RO-3B S/N 6462

Calibration date 8-2-95 DUE 8-2-96

5.2 SAFETY INTERLOCKS TEST

James Miller 12/27/95
5.2.1

Verify that a key-actuated control is present.

Ref. WHC-SD-WM-ATP-157
REV 0

James Miller 12/27/95
5.2.1.a

Verify that x-ray generation is not possible with the key removed.

James Miller 12-27-95
5.2.2

Verify that all safety interlocks are functional and operate as required by the NDE representative.

James Miller 12-27-95
5.2.3

Individually "trip" all safety interlocks and verify that it is not possible to re-energize the x-ray system with the interlock switch re-engaged.

James Miller 12-27-95
5.2.4

Reset the x-ray system at the control console.

5.3 X-RAY MACHINE TEST

James Miller 12/27/95
5.3.1

Locate the control, other than safety interlocks or main power control, to initiate and terminate the generation of x-rays.

James Miller 12/27/95
5.3.2

Verify procurement specification of a fully operational highly stabilized (40K Hz. Power Supply) Philips MG 165/4.5 X-ray Machine

James Miller 12/27/95
5.3.3

Confirm vendor or manufacturer measured focal spot sizes for both focal spots.

James Miller 12/27/95
5.3.4

Verify the presence of a fixed X-ray tube head conical diaphragm to collimate the beam.

James Miller 12-27-95
5.3.5

Activate the power and confirm at least a 20 second delay from the initiation of x-rays to the production of x-rays.

James Miller 12/27/95
5.3.5

Activate the power and confirm that both the X-ray focal spots are operational and generate X-rays for at least 2 minutes from the initiation of x-rays.

5.4 RADIATION GENERATION INDICATORS TEST

James Miller 12/27/95
5.4.1

Identify at least two independent means which indicate when and only when x-rays are being generated. (One of the indicators required may be a milliammeter labeled to indicate x-ray tube current.)

James Miller 12/27/95
5.4.2

Confirm that all other indicators are legibly labeled "X-RAY ON".

Ref. WHC-SD-WM-ATP-157
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James Miller 12/27/95
5.4.3
James Miller 12/27/95
5.4.4

Verify the other indicator(s) are visible from each door, access panel, and port; check that all warning lights are red.

Confirm that a blinking red light is present and illuminated on the exterior of the cabinet when and only when x-rays are being produced. This light is to be within 24 inches of the Cam-lock adaptor coupling.

5.5 RADIATION GENERATION DEVICE POSTING

James Miller 12/27/95
5.5.1
James Miller 12/27/95
5.5.2

Identify that the "Radiation Generating Device" sign is posted on all sides of the enclosure per ANSI N2.1 and N12.1.

Identify the permanently affixed or cabinet inscribed, location of any controls which can be used to initiate x-ray generation. Verify that all have a clearly legible and visible label bearing the statement:

"CAUTION: X-RAYS PRODUCED WHEN ENERGIZED"

5.6 MANUALS AND MSDS TEST

James Miller 12/27/95
5.6.1
James Miller 12/27/95
5.6.1.a
James Miller 12/27/95
5.6.1.b
James Miller 12/27/95
5.6.1.c
James Miller 12/27/95
5.6.2
12/27/95

Confirm that the operation or maintenance manual has the following technical and safety information:

Potential, current, and duty cycle of the X-ray equipment.

Any radiological safety procedures or precautions which may be necessary because of unique features of the system.

Schedule of maintenance necessary to keep the system in compliance with 21 CFR 1020.40 and ANSI 43.3.

Check Material Safety Data Sheets for information on all oils and cooling fluids.

Air conditioner ☒

X-ray cooler anti-freeze ☒

X-ray cooler refrigerant ☒

Ref. WHC-SD-WM-ATP-157
REV 0

X-ray power supply/high voltage tank ☒

5.7 X-RAY IMAGE INTENSIFIER TEST

5.7.1

12/28/95

Confirm the intensifier is a tri-field 9 inch image intensifier Thomson Model Th 9438 HX or equivalent.

Mfg. THOMSON

Model No. TH 9438 HX 4661 VR02

Serial No. 550088

5.7.2

12/28/95

Verify the vendor documents of image intensifier resolution measurement are:

- a. Minimum of 5.0 line-pairs/mm in 215 mm mode. 5.4
- b. Minimum of 5.6 line-pairs/mm in 160 mm mode. 6.2
- c. Minimum of 6.8 line-pairs/mm in 120 mm mode. 7.0

Verify that the output image field size of 25 mm diameter.

5.8 X-RAY IMAGING CAMERA TEST

5.8.1

12/28/95

Confirm that the CCD camera has a minimum of 1100 horizontal and 450 vertical elements and a minimum of resolution of 850 TV lines.

Mfg. VJ TECHNOLOGIES

Model No. CA-VJ11

Serial No. 379

5.8.2

12/27/95

Verify three modes of camera operation. A normal mode with 486 TV lines of resolution at an illumination of 13.6 lux. A low light mode with a vertical resolution of 350 lines at an illumination of 6.8 lux. An integrated mode where two fields are displayed from a single integrated image at a vertical resolution of 486 TV lines at 6.8 lux.

5.8.3

12/27/95

Confirm that the 10 to 110 mm, F-stop 1.6/1.8 motorized zoom lens with a motorized iris and focus controls are remotely located at the control console.

Ref. WHC-SD-WM-ATP-157
REV 0

Mfg. N/A
Model No. 11-110 mm
Serial No. L-124979

5.9 X-RAY SHUTTERS TEST

James Miller 12/27/95
Jim [unclear] 12-27-95
5.9.2

Verify that the two sets of four-way shutters operate independently of each other.

Verify that each of the shutter leaves operates smoothly over the full travel/stroke.

5.10 X-RAY MANIPULATOR TEST

James Miller 12/27/95
5.10.1

Confirm that a remotely operated manipulator system for positioning image quality indicators and four standard samples is present.

5.11 X-RAY DISPLAY MONITORS TEST

James Miller 12/28/95
5.11.1

Confirm two, ¹⁵ inch monitors with a horizontal resolution of 1000 TV lines with a minimum of 10 shades of grey scale are present.

Monitor Mfg. ELECTROHOME

Model No. CRT-15M

Serial Nos. 18682A105 18682A100

Right hand monitor is fed (won't work otherwise)
Jim 12/28/95

EXCEPTION 1

5.12 X-RAY PENETRATION AND RESOLUTION TEST

Jim 12/28/95
5.12.1

DELETE REQUIREMENT

Verify that ASTM number 7 plaque penetrometer's 2T hole is visible on the monitor when radiographed through the sample guide tube (approximately .372 inches of steel) with no image processing.

Jim 12/27/95
5.12.2

Demonstrate spacial resolution of 3.5 line-pairs/mm on the display monitor without any image processing.

5.13 X-RAY PRINTER TEST

Ref. WHC-SD-WM-ATP-157
REV 0

Demonstrate the hard copy printer has a print density of 300 dots per inch and a grey scale rendition of 128 gradations minimum.

Mfg. SEIKOSHA

Model No. JP 4500

Serial No. P-KM0501546

Confirm normal print size is approximately 6.0 X 8.0 inches.

Verify that the printer is capable of displaying multiple image segments.

5.14 X-RAY VIDEO RECORDER TEST

Confirm that a 1/2 inch S-VHS video cassette recorder with 400 lines of monochrome resolution has been provided.

Mfg. SONY

Model No. SVD 9500 MD

Serial No. 0022960-5

Verify that the system is equipped for audio recording of inspection record narrative.

5.15 X-RAY IMAGE PROCESSOR TEST

Mfg. VJ TECHNOLOGIES

Model No. VJ-340

Serial No. 1319

Check the video text writer and pointer generator.

Verify background subtraction, image averaging, image accumulation and frozen image functions.

Rev. WHC-SD-WM-ATP-157
REV 0

5.16 TRAILER CONSTRUCTION TEST

Don Miller 5.16.1

Obtain the following information:

PINTEL Hitch size and type

✓ Tongue weight marked

STANDARD Safety chain size

Don Miller 5.16.2

Verify the following are provided:

- Brake and stop-lights, turn-indicator lights.
- GVW permanently marked on trailer.
- Lift/Hoisting rigging points identified.
- Center-of-Gravity of assembly identified.

12/27/55

EXECUTION AND TEST APPROVAL SHEET

EXECUTORS

James R. Wehr CEE 12/27/95 Jim (Dwyer) NDE 12-27-95
 Director/Organization Date Operator/Organization Date
James R. Wehr CEE 12/27/95
 Recorder/Organization Date

WITNESSES

BB French / Health Physics 12/27/95 * Jim Kane NDE Level III 12-96
 Witness/Organization Date Witness/Organization Date
Alan Anderson NDE 12/27/95 _____
 Witness/Organization Date Witness/Organization Date

*NOTE: During the revision of the exceptions, it was identified that the NDE Level 3 needed to approve the appropriate test step modifications.

TEST APPROVAL AND ACCEPTANCE

Westinghouse Hanford Company

Without exceptions _____ With exceptions resolved X With exceptions outstanding _____

James R. Wehr CEE 12/28/95 Jim Kane CEE 12/28/95
 (Title or Department) Date (Title or Department) Date

Re. WHC-SD-WM-ATP-157
REV 0

EXCEPTION SHEET

EXCEPTION NUMBER: 1DATE: 12/28/95EXCEPTION: 5.12.1 ASTM No. 7 plaque penetrometer
visible - - - - -

PLANNED ACTION:

DELETE Requirement

ACTION TAKEN:

DELETEDDATE: 12/28/95

* See Execution and Test Approval Sheet

EXCEPTION/RETEST APPROVAL:

 Retest approved
and accepted Exception
accepted as is
(Need details) X Other
(Need details)

Details:

SECTION 5.12.2 -- 3.5 LINE PAIRS PER
MILLIMETER IS A BETTER INDICATION
OF OVERALL SYSTEM PERFORMANCE

KMP 12-28-95John Miller 12/28/95
* John L. Kane 1-24-96

Ref. WHC-SD-WM-ATP-157
REV 0

EXCEPTION SHEET

EXCEPTION NUMBER: 2DATE: 12/28/95EXCEPTION: 5.14.2 .. AUDIO RECORDING
CAPABILITY - - - -

PLANNED ACTION:

DELETE Requirement

ACTION TAKEN:

DELETEDDATE: 12/28/95

* See Execution and Test Approval Sheet

EXCEPTION/RETEST APPROVAL:

 Retest approved
and accepted Exception
accepted as is
(Need details)X Other
(Need details)

Details:

NOISE LEVEL IN FIELD USE
PREVENTS USEFUL RECORDING OR
NARRATIONJohn Miller 12/28/95Kim J. Smith
12-28-95

SEIKOSHA Printer
System 204

FINAL Setup 12/27/82

P-KM0501546

CONTROL LIST(1.09)

GAIN	AUTO1
FILTER(LOW/COLOR)	MIDDLE/NONE
REVERSE	OFF
FILE No.	No.33 ✓
NOISE REDUCTION	1
CONTRAST & BRIGHTNESS	AUTO(14/+00)
EXPANSION(H)	X1
EXPANSION(U)	X2
TRIMMING(H)	0020 mm
LENGTH(H)	0215 mm
TRIMMING(U)	017 RASTERS
LENGTH(U)	0480 RASTERS
PAGE LENGTH	0215 mm
FRONT DISTANCE	000 mm
LEFT DISTANCE	000 mm
CUT MARK	OFF
ROTATION	PORTRAIT
PAPER SELECT	2
QUANTITY	01
SIGNAL TYPE	COMPOSITE VIDEO
SCANNING METHOD	INTERLACED
ODD/EVEN SELECT	1
--- V.SYNC PHASE	*****
SAMPLING CLOCK	INTERNAL
--- H.EXPANSION	024.4 MHz
--- CLOCK PHASE	*****
H.SYNC PHASE	OFF
SPEED & RESOLUTION	NORMAL NORMAL 256
CLOCK FREQUENCY	024.37 MHz
H.SYNC FREQUENCY	015.73 KHz
V.SYNC FREQUENCY	059.95 Hz
MULTI FORMAT	OFF
TERMINATION(REAR PANEL)	
--- R	TTL/ANALOG 75Ω ON
--- B	TTL/ANALOG 75Ω ON
--- G/VIDEO	HIGH
--- H.SYNC/C.SYNC	TTL 75Ω ON
--- V.SYNC	TTL 75Ω ON
--- EXT.CLK	TTL 75Ω ON

V.J. Technologies, Inc.
89 Carlough Rd.
Bohemia, NY 11716-2903

WHC-SD-WM-ATR-157 Rev. 0

**** PACKING SLIP ****
Sales Invoice 3329
Date 12/4/95
Customer ID WESHA

(516) 589-8800
Fax (516) 589-8992

Purchase Order ID MDW-XDV-428742
Tax Exemption ID

Bill To

Westinghouse Hanford Co.
Accts Payable (MSING1-80)
P.O Box 1970
Richland, WA 99352

Ship To

Westinghouse Hanford Co.
Dept. of Energy
Central Receiving
2355 Stevens Drive,, 99352

Quantity Description

1.00	II-550088 - 9" Image Intensifier
1.00	L11090808 - Image Intensifier right angle LENS M/N 95mm
1.00	PS-000310 - Image Intensifier Trifield P/S
1.00	PS-184263 - Power Supply M/N FS-24
1.00	CA-VJ111-379 - High Resolution Camera M/N VJ-111 CCD
1.00	L-124979 - Camera Zoom Lens 11-110mm
1.00	Plug-In Camera Power Supply
1.00	L-36905H - Control for Zoom Lens
1.00	Manipulator M/N VJ-101-1
1.00	XRAY-TUB-911517 - Tube, MCN165, Flange conn. X-ray Source
1.00	XRC-9511001066 - X-ray Controller
1.00	TCO-2889-95 - Turmoil Cooler M/N OCN-33R
1.00	PS-9550800030 - X-ray Power supply 4.5W
1.00	XRG-9521100041 - X-ray minus Generator
1.00	Oil Hoses
1.00	MO-18682A105 - 15" Monitor M/N CRT-15M
1.00	MO-18682A100 - 15" Monitor M/N CRT-15M
1.00	P-KM0501546 - Printer M/N VP-4500
1.00	VCR-0022960-5 - Sony VCR SVO9500MD/1+Remote
1.00	VJ-340-1319 - Image Processor M/N VJ-340
1.00	KB-L953100192 - Keyboard
1.00	TB-T50101066 - Track Ball M/N T50101066
1.00	AC-9530956-4 - AIR CONDITIONER
1.00	XR-SH-101895-1 - Shutter for II VJ-400-SI
1.00	XR-SH-101895-3 - X-ray Shutter M/N VJ-400-SX
1.00	Manipulator 1-Axis for line pair pattern VJ101-1 S/N 5
1.00	Manipulator 1-Axis for penetrameters M/N VJ101-1 S/N 8
1.00	PS-100076 - M/N FS-12 Power Supply for both shutters and both manipulators
ONLY→ 1.00	P-KM0501546 - Printer M/N VP-4500

12.5.95 - Fed Exp - Overnight

Shipping Method Miscellaneous
Salesperson Vijay V. Alreja
Payment Terms Check
Payment Method No Payment Received
Memo Job # 2490

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APPENDIX L

REPEAT ATP FOLLOWING HV GENERATOR REPLACEMENT

OCT 24 1995

ENGINEERING DATA TRANSMITTAL

1. EDT

Nº 613783

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.: 611321	7. Purchase Order No.: MDW-XDV-428742	9. Equip./Component No.: N/A	10. System/Bldg./Facility: N/A	12. Major Assm. Dwg. No.: N/A	13. Permit/Permit Application No.: N/A	14. Required Response Date: ASAP
Characterization Equipment Development (75220)	Characterization Equipment Design (75230)							
5. Proj./Prog./Dept./Div.: N4H4E	6. Cog. Engr.: J. R. Weber	8. Originator Remarks: The attached supporting document WMC-SD-WM-ATR-157, Rev. 0, is the Acceptance Test Procedure for core sample X-Ray Imaging Systems number 2, 3, and 4.						
11. Receiver Remarks: N/A								

15. DATA TRANSMITTED	(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval	(G) Reason for Transmittal	(H) Disposition
1	WMC-SD-WM-ATR-157	0	ATP for Core Sample X-Ray Systems 2, 3, and 4	Q	1/2	1	1	1
16. KEY								
Approval Designator (F)								
Reason for Transmittal (G)								
Disposition (H) & (I)								
1. Approved								
2. Approved w/comment								
3. Disapproved w/comment								
4. Reviewed no/comment								
5. Reviewed w/comment								
6. Receipt acknowledged								
17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)								
(G)	(H)	(I) Signature (J) Name (K) Signature (L) Date (M) MSIN						
Rea-son	Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(N) Signature	(O) Date	(P) MSIN
1/2	1/1	Cog-Eng. J. R. Weber	10/12/95	10/12/95	10/12/95	10/12/95	10/12/95	10/12/95
1/2	1	Cog. Mgr. D. W. Hamilton	10/12/95	10/12/95	10/12/95	10/12/95	10/12/95	10/12/95
1	1	QA D. C. Board	10/12/95	10/12/95	10/12/95	10/12/95	10/12/95	10/12/95
		Env.						
		Safety						
		CED Mgr. C. E. Hanson	10/12/95	10/12/95	10/12/95	10/12/95	10/12/95	10/12/95
		Central Files						

18. Originator Signature of EDT	19. Authorized Representative Date	20. Cognizant Manager Date	21. DOE APPROVAL (if required)
J. R. Weber 10/12/95	C. E. Hanson 10/12/95	D. W. Hamilton 10/12/95	[] Approved w/comments [] Disapproved w/comments Ctrl. No.

RELEASE AUTHORIZATION**Document Number:** WHC-SD-WM-ATR-157, REV 0**Document Title:** ATP for Core Sample X-Ray Systems 2, 3, and 4**Release Date:** 10/24/95

This document was reviewed following the
procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:
Kara Broz
10/24/95

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Telephone: (509) 372-2420; Fax: (509) 376-4989

SUPPORTING DOCUMENT		1. Total Pages 18
2. Title ATP for Core Sample X-Ray Systems 2, 3, and 4.	3. Number WHC-SD-WM-ATR-157	4. Rev No. 0
5. Key Words Mobile, X-Ray, Test, Core, Sample, System	6. Author Name: J. R. Weber 10-23-95 <i>[Signature]</i> Signature Organization/Charge Code 75230/N4H4E	
7. Abstract <p>This ATP has been prepared to demonstrate that each of the mobile X-Ray Imaging (XRI) system will function as initiated by the Westinghouse Hanford Company (WHC) procurement requisition 428742 and all relevant alterations. This document was prepared in compliance with WHC-CM-6-1, Standard Engineering Practices, EP-4.2, Testing Practices.</p>		
8. RELEASE STAMP <div>OFFICIAL RELEASE (w) BY VMO DATE OCT 24 1995 Stu 4</div>		

Ref WHC-SD-WM-ATP-157
REV 0

**MOBILE X-RAY IMAGING SYSTEM
ACCEPTANCE TEST PROCEDURE
FOR
PURCHASE ORDER NUMBER MDW-XDV-428742**

Author

J. R. Weber

Ref. WHC-SD-WM-ATP-157
REV 0

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Ref. WHC-SD-WM-ATP-157
REV 0

MOBILE X-RAY IMAGING SYSTEM
ACCEPTANCE TEST PROCEDURE
FOR
PURCHASE ORDER NUMBER MDW-XDV-428742

1.0 PURPOSE OF THE TEST

This Acceptance Test Procedure (ATP) has been prepared to demonstrate that each of the mobile X-Ray Imaging (XRI) systems will function as intended by the Westinghouse Hanford Company (WHC) procurement requisition 428742 and all relevant alterations. This document was prepared in compliance with WHC-CM-6-1, *Standard Engineering Practices*, EP-4.2, Testing Practices.

This document is related to the Acceptance Test Procedure WHC-SD-WM-ATP-133 which documents the tests performed on the "Prototype" Core-sample X-ray imaging system. For this reason, changes from the referenced ATP are shown in "red-line" text in this document. The test results will be issued as an Acceptance Test Report (ATR), WHC-SD-WM-ATR-157, after all testing is complete. The test will be performed at the vendor's facility prior to shipment to the Hanford Site and portions of the ATP will be re-run following shipment from the vendor to verify that no changes occurred in transit. This is specified in the contract documents.

1.1 SYSTEM DESCRIPTION

The XRI system is a mobile real-time radiographic system designed to safely examine radioactive tank core segments collected at the Hanford site. The mobile XRI System is designed to meet the requirements of 21 CFR 1020.40, ANSI N43.3, and applicable Washington State licensing requirements.

2.0 RESPONSIBILITIES

The test shall be performed by a test director from the WHC at the vendor facility. The test director shall be a person technically qualified and knowledgeable of the safety requirements associated with the testing.

Each company or organization participating in the conduct of this test will designate personnel to assume the responsibilities and duties as defined herein. The names shall be provided to the recorder for listing on the recorder's copy of the test execution sheet prior to the performance of any part of the test.

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2.1 TEST DIRECTOR

The WHC shall provide a test director to coordinate all acceptance testing. The Test Director shall:

- The test director is responsible for assuring that the test is performed in accordance with this document. The test director's duties include, but are not limited to: coordinating and oversight of test performance, signing or designating an authority to sign the completion of each indicated step and resolve exceptions to this test.
- The test director shall decide whether to continue the test after the discovery of an exception [See Section 3.0]. The test shall not continue without resolving and repairing a non-conformance unless the test director determines that the non-conformance will not jeopardize personnel or equipment.
- Confirm that field testing and inspection of the system or portion of the system to be tested has been completed.
- Stop any test which may pose any danger to personnel or cause damage to the system until the test procedure has been revised.
- Evaluate recorded data, discrepancies, and exceptions.
- Obtain from the design engineer any information or changes necessary to clear or resolve objections.
- Signs the Execution and Test Approval Sheet.
- Signs any Exception Sheets when any required retest has been executed and accepted.
- Obtain required signatures on the ATP master prior to reproduction and distribution.

2.2 TEST OPERATOR

The vendor shall provide a Test Operator. The Test Operator shall:

- Perform the test under the direction of the Test Director.
- Provide labor, equipment, and test instruments required for performing tests.

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- Confirm that all equipment required for performing tests will be available at the start of testing.
- Sign the Execution and Test Approval Sheet.

2.3 TEST RECORDER

A Test Recorder to record all acceptance testing will be provided. The Test Recorder shall:

- Prepare a field copy from the ATP Master.
- Record the names of all designated personnel on the Field copy of ATP prior to start of testing.
- Record test instrument identification numbers and calibration expiration dates as required.
- Initial and date every test step on the Field copy as it is completed.
- Record objections and exceptions on an Exception Sheet.
- Sign the Execution and Test Approval Sheet when Test has been performed.
- After test is completed, assign alpha numeric page numbers to any added Exception Sheets and records page numbers in the Table of Contents.
- Sign Exception Sheet(s) when exceptions have been resolved.
- Transfers Filed copy entries to the ATP Master in ink, signs, and dates. Transmits the Master to the Test Director for approval signature routing.

2.4 QUALITY ASSURANCE

The WHC Quality Assurance (QA) organization shall:

- Review and approve exception resolutions, and shall review and accept test results.
- Shall review and approve each exception; this approval may be obtained at the time the resolution is written OR QA approval may

be postponed until a QA representative reviews the test results, following test completion, at the discretion of the test director.

2.5 TEST WITNESSES

WHC shall provide a Level II or Level III non-destructive examination (NDE) Radiographer to witness specific parts of the acceptance testing. The Test Witness shall:

- Witness the tests.
- Review the results of the tests.
- Assist the Test Director as required.
- Sign the Test Execution and Approval Sheets when test has been performed.
- Sign any Exception Sheet(s) when exception has been resolved.

2.6 ACCEPTANCE CRITERIA

One section of this test is critical in relation to the safe operating envelope established for this equipment by 21 CFR Chapter 1 (April 1, 1991 Edition). Section 1020.40 establishes the maximum allowable radiation dose rate at a distance of 5 cm from the surface of the XRI cabinet. The maximum dose rate 5 cm from the surface of the XRI cabinet shall be verified to less than this limit in accordance with Section 5.1.1.

Section 5.12 defines the X-ray systems required penetration and resolution. The acceptance criteria is the radiographic visibility, on the systems display monitors of a 2T hole in an ASTM number 7 steel penetrometer through the sampler. A spacial resolution of 3.5 line pairs/mm must also be demonstrated on the monitors by imaging a standard converging line pairs plaque.

This test verifies basic operationing functions of the equipment. The acceptance criteria is based on the presence, individual operability and ability of the components of the equipment/system to operate in an integrated system as if it were being used in the field. Each step shall be evaluated and signed off by the cognizant engineer to verify that the equipment is acceptable for use.

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3.0 ATP EXCEPTIONS, CHANGE CONTROL AND DATA RECORDING INSTRUCTIONS

Throughout the procedure, spaces are provided for the test director's initials. Any exceptions (deviations from design requirements or stated operational limits) that arise during the test shall be recorded on an ATP Exception Sheet, and the exception number shall be noted next to the procedure step involved. Exception sheets are not needed for steps that are followed by rework or recovery instructions to perform ATP deviation resolutions. Exception resolutions may include troubleshooting and repair instructions. The resolution for each exception is subject to approval by the test director.

If the procedure requires modification due to test circumstances, the test director or designated representative may red-line the ATP record copy. The initials of the person making the change, and the date, shall be recorded next to the red line change. If necessary for clarity, the change may be described on an ATP exception sheet. QA approval is not needed on exception sheets that are used only to clarify red line procedure changes.

After the test is complete, the ATP Test Execution and Acceptance Sheet shall be completed as follows.

- 3.1 Check the applicable space on the ATP Test Execution and Acceptance Sheet indicating whether the ATP has been performed with exception or without exception.
- 3.2 The test performers shall sign and date the sheet in the spaces provided.
- 3.3 After the ATP execution section is completed, and all the exceptions have been resolved, the ATP Acceptance signatures shall be obtained.
- 3.4 A copy of the completed test shall be forwarded to the test director.
- 3.5 Corrected copies of the ATP and vendor drawings which incorporate all redlines is to be delivered as-built and complete prior to final acceptance.

4.0 TEST EQUIPMENT

- The vendor shall provide temporary wiring, power required for the operation of the equipment.
- The x-ray equipment will be warmed up according to the manufacturers procedures.

FEBRUARY 3, 1995

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- Calibrated radiation survey measuring equipment will be provided by the vendor.
- Any other prescribed equipment as designated by the test director.

* VERIFY STEPS RELATED TO POWER SUPPLY

40-60-6044

5.0 MOBILE XRI ACCEPTANCE TEST EXECUTION SECTION

MOBILE X-RAY EXAMINATION SYSTEM IDENTIFICATION NUMBER

004

5.0.1

EXCEPTION 1

Before executing the XRI ATP, the test director and test operator will conduct a walk down of the system and inspect for general conformance to the design media (e.g. vendor drawings and equipment data sheets). Any non-conformance(s) must be recorded on an Exception Sheet and incorporated into an as-built document prior to final acceptance as outlined in section 3.5.

5.0.2

VERIFY that the focal spot of the X-ray tube is aligned with the centerline of the image intensifier.

5.0.2

VERIFY that the image intensifier lead mask aligned with the centerline of the image intensifier.

5.0.2

VERIFY that the sample duct lead mask aligned with the centerline of the image intensifier.

5.1 RADIATION LEAKAGE TEST

5.1.1

Verify that the maximum radiation level at any accessible point on the cabinets, 5 cm from the enclosure, is <0.5 mR/hr.

5.1.2

Record the following data from radiation survey meter:

Manufacture

EBERLINE

Model

RO-3B

Calibration date

3/9/95

DUE 3/9/96

5.2 SAFETY INTERLOCKS TEST

5.2.1

Verify that a key-actuated control is present.

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Verify that x-ray generation is not possible with the key removed.

Verify that all safety interlocks are functional and operate as required by the NDE representative.

Individually "trip" all safety interlocks and verify that it is not possible to re-energize the x-ray system with the interlock switch re-engaged.

Reset the x-ray system at the control console.

5.3 X-RAY MACHINE TEST

Locate the control, other than safety interlocks or main power control, to initiate and terminate the generation of x-rays.

Verify procurement specification of a fully operational highly stabilized (40K Hz. Power Supply) Philips MG 165/4.5 X-ray Machine

Confirm vendor or manufacturer measured focal spot sizes for both focal spots.

Verify the presence of a fixed X-ray tube head conical diaphragm to collimate the beam.

Activate the power and confirm at least a 20 second delay from the initiation of x-rays to the production of x-rays.

Activate the power and confirm that both the X-ray focal spots are operational and generate X-rays for at least 2 minutes from the initiation of x-rays.

5.4 RADIATION GENERATION INDICATORS TEST

Identify at least two independent means which indicate when and only when x-rays are being generated. (One of the indicators required may be a milliammeter labeled to indicate x-ray tube current.)

Confirm that all other indicators are legibly labeled "X-RAY ON".

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Verify the other indicator(s) are visible from each door, access panel, and port; check that all warning lights are red.

Confirm that a blinking red light is present and illuminated on the exterior of the cabinet when and only when x-rays are being produced. This light is to be within 24 inches of the Cam-lock adaptor coupling.

5.5 RADIATION GENERATION DEVICE POSTING

5.5.1 Identify that the "Radiation Generating Device" sign is posted on all sides of the enclosure per ANSI N2.1 and N12.1.

5.5.2 Identify the permanently affixed or cabinet inscribed, location of any controls which can be used to initiate x-ray generation. Verify that all have a clearly legible and visible label bearing the statement:

"CAUTION: X-RAYS PRODUCED WHEN ENERGIZED"

5.6 MANUALS AND MSDS TEST

Confirm that the operation or maintenance manual has the following technical and safety information:

5.6.1.a Potential, current, and duty cycle of the X-ray equipment.

5.6.1.b Any radiological safety procedures or precautions which may be necessary because of unique features of the system.

5.6.1.c Schedule of maintenance necessary to keep the system in compliance with 21 CFR 1020.40 and ANSI 43.3.

5.6.2 Check Material Safety Data Sheets for information on all oils and cooling fluids.

Air conditioner _____

X-ray cooler anti-freeze _____

X-ray cooler refrigerant _____

R& WHC-SD-WM-ATP-157
REV 0

X-ray power supply/high voltage tank _____

5.7 X-RAY IMAGE INTENSIFIER TEST

_____ 5.7.1 Confirm the intensifier is a tri-field 9 inch image intensifier Thomson Model Th 9438 HX or equivalent.

Mfg. _____

Model No. _____

Serial No. _____

_____ 5.7.2 Verify the vendor documents of image intensifier resolution measurement are:.

a. Minimum of 5.0 line-pairs/mm in 215 mm mode.

b. Minimum of 5.6 line-pairs/mm in 160 mm mode.

c. Minimum of 6.8 line-pairs/mm in 120 mm mode.

_____ 5.7.3 Verify that the output image field size of 25 mm diameter.

5.8 X-RAY IMAGING CAMERA TEST

_____ 5.8.1 Confirm that the CCD camera has a minimum of 1100 horizontal and 450 vertical elements and a minimum of resolution of 850 TV lines.

Mfg. _____

Model No. _____

Serial No. _____

_____ 5.8.2 Verify three modes of camera operation. A normal mode with 486 TV lines of resolution at an illumination of 13.6 lux. A low light mode with a vertical resolution of 350 lines at an illumination of 6.8 lux. An integrated mode where two fields are displayed from a single integrated image at a vertical resolution of 486 TV lines at 6.8 lux.

_____ 5.8.3 Confirm that the 10 to 110 mm, F-stop 1.6/1.8 motorized zoom lens with a motorized iris and focus controls are remotely located at the control console.

Ref. WHC-SD-WM-ATP-157
REV 0

Mfg. _____

Model No. _____

Serial No. _____

Not Applicable
J. Miller
1/9/96

5.9 X-RAY SHUTTERS TEST

- _____ 5.9.1 Verify that the two sets of four-way shutters operate independently of each other.
- _____ 5.9.2 Verify that each of the shutter leaves operates smoothly over the full travel/stroke.

5.10 X-RAY MANIPULATOR TEST

- _____ 5.10.1 Confirm that a remotely operated manipulator system for positioning image quality indicators and four standard samples is present.

5.11 X-RAY DISPLAY MONITORS TEST

- _____ 5.11.1 Confirm two, 13 inch monitors with a horizontal resolution of 1000 TV lines with a minimum of 10 shades of grey scale are present.

Monitor Mfg. _____

Model No. _____

Serial Nos. _____

5.12 X-RAY PENETRATION AND RESOLUTION TEST

EXCEPTION 3

- B. A. A. V.* _____ 5.12.1 Verify that ASTM number 7 plaque penetrameter's 2T hole is visible on the monitor when radiographed through the sample guide tube (approximately .372 inches of steel) with no image processing.
- _____ 5.12.2 Demonstrate spacial resolution of 3.5 line-pairs/mm on the display monitor without any image processing.

5.13 X-RAY PRINTER TEST

R.R. WHC-SD-WM-ATP-157
REV 0

- 5.13.1 Demonstrate the hard copy printer has a print density of 300 dots per inch and a grey scale rendition of 128 gradations minimum.
- Mfg. _____
- Model No. _____
- Serial No. _____
- 5.13.2 Confirm normal print size is approximately 6.0 X 8.0 inches.
- 5.13.3 Verify that the printer is capable of displaying multiple image segments.
- 5.14 X-RAY VIDEO RECORDER TEST
- 5.14.1 Confirm that a 1/2 inch S-VHS video cassette recorder with 400 lines of monochrome resolution has been provided.
- Mfg. _____
- Model No. _____
- Serial No. _____
- 5.14.2 Verify that the system is equipped for audio recording of inspection record narrative.
- 5.15 X-RAY IMAGE PROCESSOR TEST
- Mfg. _____
- Model No. _____
- Serial No. _____
- 5.15.1 Check the video text writer and pointer generator.
- 5.15.2 Verify background subtraction, image averaging, image accumulation and frozen image functions.

*Not applicable
1/9/96*

Ref. WHC-SD-WM-ATP-157
REV 0

5.16 TRAILER CONSTRUCTION TEST

5.16.1

Obtain the following information:

Hitch size and type

Tongue weight marked

Safety chain size

5.16.2

Verify the following are provided:

- Brake and stop-lights, turn-indicator lights.
- GVW permanently marked on trailer.
- Lift/Hoisting rigging points identified.
- Center-of-Gravity of assembly identified.

Ref. WHC-SD-WM-ATP-157
REV 0

EXECUTION AND TEST APPROVAL SHEET

EXECUTORS

<u><i>James Miller</i> CEE</u> Director/Organization	<u>1/3/96</u> Date	<u><i>Ken Willoughby</i> NDE</u> Operator/Organization	<u>1-3-96</u> Date
<u><i>James Miller</i> CEE</u> Recorder/Organization	<u>1/3/96</u> Date		

*NOTE: During the revision of the exceptions, it was identified that the NDE Level 3 needed to approve the appropriate test step modifications.

WITNESSES

<u><i>Ed Pace</i> / HPT</u> Witness/Organization	<u>1-3-96</u> Date	<u><i>John K. Lee</i></u> Witness/Organization	<u>1-24-96</u> Date
<u><i>Ken Willoughby</i> Q.C.</u> Witness/Organization	<u>1-3-96</u> Date	_____ Witness/Organization	_____ Date

** WITH EXCEPTIONS #1, #2 ONLY
 KEN WILLoughBY
 D.C. Board, Leg. Board 1-3-96 C.A.

TEST APPROVAL AND ACCEPTANCE

Westinghouse Hanford Company

Without exceptions _____	With exceptions resolved <u>X</u>	With exceptions outstanding _____
--------------------------	-----------------------------------	-----------------------------------

<u><i>Don Board</i> QA</u> (Title or Department)	<u>1-16-96</u> Date	<u><i>James Miller</i> CEE</u> (Title or Department)	<u>1/16/96</u> Date
---	------------------------	---	------------------------

Rev. WHC-SD-WM-ATP-157
REV 0

EXCEPTION SHEET

EXCEPTION NUMBER: 1DATE: 1/3/96EXCEPTION: WALK DOWN . . .

PLANNED ACTION:

Portions of the ATP ARE TO
BE RE-RUN. SINCE THE INTERLOCK SWITCH
WIRING WAS DISCONNECTED TO CHANGE THE
HV GENERATOR AND POWER SUPPLY RECHECK WAS RUN

ACTION TAKEN:

DATE: 1/3/96

RE-RUN PARTS OF ATP.

* See Execution and Test Approval Sheet

EXCEPTION/RETEST APPROVAL:

Retest approved
and accepted

Exception
accepted as is
(Need details)

☒ Other
(Need details)

Details:

THE X-RAY POWER SUPPLY WAS REPLACED
WITH A SPARE POWER SUPPLY AND HIGH
VOLTAGE GENERATOR WHEN REPEATED ERROR
CODE "TUBE ARCHING" AND "WILD" FLUCTUATIONS
OF "KV" WERE ENCOUNTERED 1/2/96.

Page 15

John Miller 1/3/96

* John K. Kane
1-24-96

Rev. WHC-SD-WM-ATP-157
REV 0

EXCEPTION SHEET

EXCEPTION NUMBER: 2DATE: 1/16/96

EXCEPTION: VERIFY PROCUREMENT OF A FULLY OPERATIONAL
..... PHILIPS MG165/4.5 X-RAY MACHINE.

PLANNED ACTION: REPLACE FAULTY MG165/4.5 POWER
SUPPLY AND HIGH VOLTAGE GENERATOR WITH
THE SYSTEM SUPPLIED AS A SPARE AND INSTALLED
IN SCOE VAULT 164.

ACTION TAKEN:

DATE: 1/3/96

POWER Supply No. A095-508-00027, AND
HIGH VOLTAGE GENERATOR No. A095-211-00035 WERE
INSTALLED IN XRI SYSTEM 004 (110-14-6044)

* See Execution and Test Approval Sheet

EXCEPTION/RETEST APPROVAL:

____ Retest approved
and accepted

____ Exception
accepted as is
(Need details)

____ ☒ Other
(Need details)

Details: CONSULTATION WITH THE VENDOR AND
THE PHILIPS SERVICE REPRESENTATIVE INDICATED THAT
THE FAULTY CONDITION "TUBE ARCING" WAS NOT
AND "KV SWINGS" WAS NOT REPARABLE IN THE
FIELD. A FACTORY RETURN AUTHORIZATION WAS
OBTAINED AND THE DEFECTIVE UNIT WILL
BE RETURNED TO "PHILIPS INDUSTRIAL".

Page 15 16

James P. Miller 1/16/96
** John Kane 1-24-96*

EXCEPTION SHEET

EXCEPTION NUMBER: 3DATE: 1/16/96EXCEPTION: VERIFY ASTM No. 7 PLAQUE PENTRAMETER
- - - - -PLANNED ACTION:DELETE THIS REQUIREMENT (VERIFICATION)
(5.12.1)ACTION TAKEN:DATE: 1/3/96DELETED VERIFICATION

* See Execution and Test Approval Sheet

EXCEPTION/RETEST APPROVAL:Retest approved
and acceptedException
accepted as is
(Need details)X Other
(Need details)

Details: IT HAS BEEN DETERMINED THAT
SECTION 5.12.12, "SPATIAL RESOLUTION OF
3.5 lp/mm ON THE DISPLAY MONITOR IS
A SUPERIOR METHOD OF DETERMINING
OVERALL SYSTEM PERFORMANCE.
SEE PAGE 17A,B OF THIS REPORT

Page 18 of 17

* John L. K...
1-16-96

R&R. WHC-SD-WM-ATP-157
REV 0

J. P. Miller
1/3/96

TEST IN NEW POWER SUPPLY

R.R. WHC-SD-WM-ATP-157
REV 0

14:22:17
JAN 3 96

AFTER
POWER SUPPLY
REPLACED

AR

HISTOGRAM

COUNT AVG
1016 133
MIN MAX
78 187
DS

SEL:repeat ESC:exit HISTOGRAM

1X

XRI SYSTEM 004 FOLLOWING REPLACEMENT OK
HV GENERATOR AND POWER SUPPLY

James M. Miller
1/16/96

Page 15 17/3

BEST AVAILABLE

APPENDIX M

RECEIVING NCR XR1-002 AND XR1-003

QUALITY ASSURANCE					
NONCONFORMANCE REPORT DISTRIBUTION					
1. FROM:		2. MSIN:		3. DATE:	
Characterization QA		57-07		11-22-95	
4. NCR No:			5. Initiation, Disposition, or Closure (I, D, or C)		
6. TO:			MSIN	I	D
Cognizant Engineer	J. R. Weber		57-12	X	X
Cognizant QA Engineer	D.C. Board		57-07	X	X
Originator	G. E. Maza		61-50	X	X
QA Manager	J. S. Sparks		57-07	X	X
Cognizant QE Manager					
Facility Manager	D. W. Hamilton		57-12	X	X
Engineering Records					
Safety	J. A. Harvey		57-07	X	X
ESQ Data	E. E. Thornton		57-01	X	X
Other:					
Work Package	P.O. # WDW-XDV-428742				
QC Inspector					
Buyer	D. R. Whitworth		61-59	X	X
PO File					
Vendor File					
CPO	D. L. Wegener		57-01	X	X
7. QUEST Codes					
Subject:		Cause:		Contr. Factor:	
8. Responsible Action Party:			Org Code:		
J. R. Weber			75230

Westinghouse Hanford Company		NONCONFORMANCE REPORT		1. Page <u>1</u> of <u>10</u>	2. Preprinted No. 053247 QA Log No. CPQA-96-05324
3. P. O. W. O., or Job Control No. WOW-KOV-428742	4. System/End Use TANK FORM CHARACTERIZATION	5. Item/Material MOBILE CORE SAMPLE RADIOGRAPH SYSTEM	6. Dwg./Spec./Other No. N/A	7. Rev. N/A	
8. Program/Project/Other N/A		9. Safety Class 3SQ	10. ASME Code Items ☐ Yes ☒ No (If yes, notify authorized inspector)		
11. Supplier Name/Address V.J. TECHNOLOGIES 89 CARLOUGH RD. BOHEMIA NY 11716-2903			12. Notification of Potential Occurrence Required ☐ Yes ☒ No		
13. Code: Lot/Heat/Serial TRAILER 002+003	14. Lot Size 2	15. Sample 2	16. Qty. Acc. Φ	17. Inspection Criteria ☐ Dwg. ☐ Spec. ☒ Insp. Plan ☐ Other	
18. Item	19. Description of Nonconformance (list serial no. where applicable)		22. Disposition, Justification, and Instructions		
①	REQUIRED CONDITION: VERIFY THE PRESENCE OF THE INTER-LOCK SWITCHES ON THE CAM-LOCK ADAPTER COUPLER. ACTUAL CONDITION: TRAILER #002, ONLY ONE ROD VISIBLE. (NOTE: THIS IS HO-64-6043)		Disposition described on page 3.		
②	REQUIRED CONDITION: RADIATION GENERATING DEVICES SENS/ LABELS ARE INSTALLED ON ALL SIDES OF THE ENCLOSURE. ACTUAL CONDITION: RADIATION SIGNS SENT BUT NOT INSTALLED.				

20. Originator's Signature GEORGE MATA		Date NOV. 17, 95	23. Design Document Change Required? ☐ Yes, Doc. No. ☒ No	
21. Cognizant QA Manager's Signature J.D. [Signature]		Date 11-22-95	24. Corrective Action Required? ☐ Yes, No. ☒ No	
25. Cognizant Engineer S.R. WEBER	Date 11/21/95	26. Technical Rep. S.R. WEBER	Date 11/21/95	Signature/Org. [Signature]
QA Engineer Don Board	Date 11-21-95	Signature/Org. [Signature]	Date 11/21/95	Signature/Org. [Signature]
27. Close Accept ☒ Reject ☐ Follow on NCR ☐				
			QA/C Personnel Don Board	Date 12/6/95

NONCONFORMANCE REPORT

(Continuation)

1. Page 2
of 10

2. Preprinted No. .

053247

QA Log No. .

8. Item	19. Description of Nonconformance (list serial no. where applicable)	22. Disposition, Justification, and Instructions
③	<p>REQUIRED CONDITION: VERIFY CENTER OF GRAVITY ON THE CABINET OR IN THE VENDOR DATA.</p> <p>ACTUAL CONDITION: CENTER OF GRAVITY NOT IDENTIFIED.</p>	
④	<p>REQUIRED CONDITION: VERIFY THE CABINET TO TRAILER CONNECTION PINS ARE PRESENT AND FUNCTIONAL</p> <p>ACTUAL CONDITION: 1 PIN ON TRAILER NOT FUNCTIONAL (OUT OF ALIGNMENT).</p>	
⑤	<p>REQUIRED CONDITION: VERIFY DATA SHEET FOR X-RAY TUBE HEAD IS INCLUDED (MADE BY COMET/PHILIPS).</p> <p>ACTUAL CONDITION: DATA SHEET FOR 1 X-RAY TUBE MISSING.</p>	
⑥	<p>REQUIRED CONDITION: VERIFY DRAWINGS IDENTIFYING SAFETY INTERLOCKS AND CONTROL CIRCUITS ARE INCLUDED IN DATA PKG.</p> <p>ACTUAL CONDITION: DATA FOR INTERLOCKS AND CONTROL CIRCUITS NOT IN DATA PKG.</p>	

Non-Conformance Report 053247
Core-Sample X-ray Imaging Systems
Number 002 and 003
Purchase Order No. WDW-XDV-428742

- DISPOSITION** Move the x-ray imaging devices to the 306 Building for initiation of the Acceptance Test Procedures. The following deficiencies may be corrected at the test facility.
1. **REWORK:** One of the interlock actuating rods on system 002 is not in place in the cam-lock adaptor. The rod has apparently slipped down into the cabinet during shipment. The rod will be repositioned prior to re-running the ATP at the 306E Facility and its function verified as noted in the ATP (WHC-SD-WM-ATR-157, Rev. 0, Sections 5.2.2 and 5.2.3).
 2. **REWORK:** The labeling (decals) provided on the cabinet meets the requirements of 21 CFR 1020.40. WHC goes beyond the requirements and adds additional "Radiation Generating Device" signs on all approaches/sides of the cabinet. These signs were provided but not attached due to the shipping schedule. They will be attached to the cabinet by WHC prior to field deployment. Reference NCR 053276, QA Log No. SSQA-95-008.
 3. **ACCEPT AS IS:** The vendor has provided a memo indicating that the center of gravity is the same as System No. 1. The vendor has identified the lifting points on the system as the four eye-bolts on the cabinets main frame, the memo is sufficient per engineering direction. Reference NCR 053276, QA Log No. SSQA-95-008.
 4. **REPAIR:** The cabinet assembly was shipped separate from the trailer. One pin is slightly out of alignment. The pin could be forced into position which would complicate removal. WHC will ream the one hole to 3/4" as previously directed by the vendor, prior to delivery to the 306E facility. Reference NCR 053276, QA Log No. SSQA-95-008.
 5. **VERIFY:** The data sheet for the x-ray tube head has been shipped under separate cover. This information shall be verified by the inspector at the 306 Building concurrent with the Acceptance Test Procedure. See page 4 of 10, inspection report item 6 completed Nov. 21, 1995.
 6. **VERIFY:** The drawings are included within the data package prior to release for field use. See page 4 of 10, inspection report item 12 completed Nov. 21, 1995.

TEST STAND #2 is P.O. ITEM #3 WHICH IS MARKED
HO-64-6642

TEST STAND #3 is P.O. ITEM #2 WHICH IS
MARKED HO-64-6643 LB 11-30-95

QUALITY ASSURANCE INSPECTION PLAN

Sheet 1 of
Safety Class 3

Item Title CORE SAMPLE X-RAY IMAGING SYSTEM		Drawing/Spec. No. P.O.# 428742					Rev. N/A
		Item Description MOBILE X-RAY SYSTEM					
		Supplier V. J. TECHNOLOGIES, INC			Inspection No. 7080		
		P.O. Subcontract WLOW-KOV-425742					
Prepared by Don Board		Date Nov 9, 1995		Item No. 1 Qty. 3		Inspected by GEM	Date Nov. 10, 1995
		Reference					
Char. No.	Inspection Characteristics	INSPECTION STATUS					Remarks
		Acc	Hld Tag	Rej	NCR	Cond. Acc	
1	Verify Compliance with Quality Assurance Clauses	DC B					Received under separate cover
2	Verify no damage						GEM Nov. 10, 1995
3	MSDS sheets x-ray cooling fluid and x-ray transformer oil. (Shell Dialox, Suva, Volkswagon Audi Antifreeze)						GEM Nov. 10, 1995
4	Quality Assurance Plan	DC B					Received with the bid package and accepted prior to the placement of the order
5	Manufacturers data	DC B					
	Verify data sheet for x-ray tube head is included (manufactured by Comet/Philips)						GEM Nov. 21, 1995
7	Verify presence of holes for the safety wire on the four (4) cam-lock adapter attachment bolts and the cabinet cover lock down						GEM Nov. 10, 1995
8	Verify the presence of the interlock switches on the cam-lock adapter coupling.				✓		053247 TRAILER # 002 ONLY ON 2 RCD VISIBLE
9	Verify the red x-ray "on" warning light is installed on the cabinet.						GEM Nov. 10, 1995
10	Radiation Generating Device signs/labels are installed on all sides of the enclosure.				✓		053247 RADIATION SIGNS SENT, BUT NOT INSTALLED
11	Verify sign/label stating "CAUTION: X-RAYS PRODUCED WHEN ENERGIZED" is on the x-ray control console.						GEM Nov. 10, 1995
12	Verify drawing identifying safety interlocks and control circuits is included.						GEM Nov. 21, 1995

M-6

QUALITY ASSURANCE INSPECTION PLAN (Continuation Sheet)		Sheet 2 of 2 Safety Class 3
Item Title CORE SAMPLE X-RAY IMAGING SYSTEM	Drawing/Spec. No. <u>N/A</u>	Rev. <u>N/A</u>
	P.O. No. 357409	
	Item No. 1	

[illegible]

NCR 053247 Page 5 of 5

Westinghouse Hanford Company		NONCONFORMANCE REPORT			1. Page <u>1</u> of <u>5</u>	2. Preprinted No. 053276 QA Log No. SSQA-95-cc8
P. O., W. O., or Job Control No. MDW-XVV-357409		4. System/End Use TANK FARMS	5. Item/Material X-RAY EXAMINATION SYSTEM	6. Dwg./Spec./Other/No. P.O. ATTACHMENT	7. Rev N/A	
8. Program/Project/Other MDW-XV-357409 CORE SAMPLE EXAMINATION			9. Safety Class 3	10. ASME Code Items ☐ Yes ☒ No (If yes, notify authorized inspector)		
11. Supplier Name/Address V.J. TECHNOLOGIES 89 CARLOUGH RD BOHEMIA N.Y. 11716-2903				12. Notification of Potential Occurrence Required ☐ Yes ☒ No		
13. Code: Lot/Heat/Serial N/A	14. Lot Size 1	15. Sample 1	16. Qty. Acc. 0	17. Inspection Criteria ☐ Dwg. ☐ Spec. ☒ Insp. Plan ☐ Other		
18. Item	19. Description of Nonconformance (list serial no. where applicable)			22. Disposition, Justification, and Instructions		
1.	<u>REQUIRED</u> "RADIATION GENERATING DEVICE" SIGNS ON ALL SIDES OF ENCLOSURE <u>AS FOUND</u> NO SIGNS PRESENT			<u>[SEE ATTACHED DISPOSITION]</u>		
2.	<u>REQUIRED</u> CENTER OF GRAVITY IS LABELED ON THE CABINET <u>AS FOUND</u> LABELING NOT PRESENT					
20. Originator's Signature <i>S.P. PETERSON</i>		Date 6/1/95		23. Design Document Change Required? ☐ Yes, Doc. No. ☒ No		
21. Cognizant QA Manager's Signature <i>Mike S. Cochran</i>		Date 6/1/95		24. Corrective Action Required? ☐ Yes, No ☒ No		
Close	25. Cognizant QA Engineer T. JARECKI	Date 6/1/95	26. Technical Rep J.R. WERER	Date 6/1/95	Signature/Org. N/A	Date
	QA Engineer A.K. SHARMA	Date 6/1/95	Signature/Org. J.K. KEVE	Date 6/1/95	Signature/Org. N/A	Date
27. 1 THRU 5 Accept ☐ Reject ☒ Follow on NCR N/A	S.C. PETERSON QA/C Personnel			6/2/95		

NONCONFORMANCE REPORT
(Continuation)1. Page 2
of 5

2. Preprinted No.

053276

QA Log No.

Item	19. Description of Nonconformance (list serial no. where applicable)	22. Disposition, Justification, and Instructions
3.	<u>REQUIRED</u> LIFTING POINTS FOR TRAILER ARE IDENTIFIED <u>AS FOUND</u> NO LIFTING POINTS ON TRAILER	[SEE ATTACHED DISPOSITION]
4.	<u>REQUIRED</u> HITCH PIN ATTACHMENT OF CABINET ASSEMBLY TO TRAILER <u>AS FOUND</u> HOLES ARE MISALIGNED ON ALL FOUR ATTACHMENT POINTS. HITCH PINS WILL NOT FIT.	
5.	<u>REQUIRED</u> AIRCRAFT TYPE SAFETY WIRE ON CAM-LOCK ATTACHMENT BOLTS <u>AS FOUND</u> COTTER KEYS USED FOR THIS FUNCTION	

Non Conformance Report 053276
Regarding Core Sample Examination
PO # MDW-XUV-357409

DISPOSITION

1. Accept as is: This labelling meets the requirements of 21 CFR 1020.40, "Cabinet X-Ray Systems," and is therefore acceptable.
2. Accept as is: Procurement alteration #2 provided for crane placement rather than vehicular location of the complete assembly in the tank farms, hence the requirement for marking the C/G. Alteration #4 required that the cabinet be removable from the trailer with permanent attached lifting points. Threaded eye-bolt locations (and eye bolts) have been permanently attached to the side columns of the cabinet structure and the vendor has provided a memo locating the center-of-gravity and the measured tongue weight of the loaded trailer (300#). This is sufficient per engineering direction.
3. Accept as is: Disposition same as item #2.
4. The cabinet assembly was to be shipped separate from the trailer. After locating and tack welding the attachment points the cabinet was removed from the trailer for shipment preparation and final welding of the attachments was performed. A 1/4" toe plate angle was also added which caused this interference. The vendor has recommended that the holes be reamed to 3/4" to allow the pins to be inserted. (Reference attachment). [Note: to expedite deployment of this equipment WHC will make this modification for the vendor]
5. Accept as is: Castle nuts and cotter pins were provided in place of safety wire. This is a suitable substitute.

ATTACHMENT FOR Item # 4
NCR # 053276**V. J. Technologies, Inc.**

89 Carlough Rd Bohemia, NY 11716-2903

Tel: (516) 589-8800 Fax: (516) 589-8992

To:	DALE WHITWORTH
Fax No:	509-372-3793
From:	John Schmieder, Service Engineer
No. of Pages:	1
Date:	5-31-95

Subject: PIN ALIGNMENT

DALE,

REAMING THE HOLES ON THE TRAILER
BLOCKS FOR CLEARANCE OF THE 3/4 INCH
PINS WILL CORRECT THE MISFIT OF
THE PINS. PER MY DISCUSSION WITH JIM
WEBER THIS IS OUR RECOMMENDATION.

PLEASE CONTACT ME IF YOU HAVE
ANY OTHER QUESTIONS.

If you have any questions or need additional information, please feel free to contact me at
516-589-8800.

Sincerely,

John Schmieder
Service Engineer

Quality Assurance Nonconformance Report Distribution

QUALITY ASSURANCE				
NONCONFORMANCE REPORT DISTRIBUTION				
1. FROM: DEBBIE A CLARK		2. MSIN: SI-52	3. DATE: 6-1-95	
4. NCR No.: 053276		5. Initiation, Disposition, or Closure (I,D,C):		
6. TO:		MSIN	I	D
Cognizant Engineer TED JARECKE				
Cognizant Quality Engineer AK SHARMA		H5-53		
Originator SC PETERSON		G1-50		
Q.A. Manager J.M. ROBERTS		A4-79		
Cognizant CE Manager J.A. PELTIER				
Facility Manager				
Engineering Records				
Safety				
OSDH				
Others:				
JCS Package				
O.C.				
Buyer (Procurement)				
P.O. File (Procurement)				
Vendor File (Procurement)				
MIKE E McELROY		S7-07		
J.R. WEBER		H7-12		
7. GST Codes				
Subject:		Cause:	Contr. Factor:	PPG:
AD-04-003		EQ-003		
8. Responsible Action Party:			Org Code:	

APPENDIX N

RECEIVING NCR XR1-004

QUALITY ASSURANCE					
NONCONFORMANCE REPORT DISTRIBUTION					
1. FROM: Characterization QA		2. MSIN: S7-07		3. DATE: 12-18-95	
4. NCR No:			5. Initiation, Disposition, or Closure (I, D, or C)		
6. TO:			MSIN	I	D
Cognizant Engineer	J. R. Weber		S7-12	X	X
Cognizant QA Engineer	D. C. Board		S7-07	X	X
Originator	G. E. Mata		G1-50	X	X
QA Manager	J. S. Sparks		S7-07	X	
Cognizant QE Manager					
Facility Manager	D. W. Hamilton		S7-12	X	X
Engineering Records					
Safety	J. A. Harvey		S7-07	X	X
ESQ Data	E. E. Thornton		S7-01	X	X
Other: Work Package	P.O.# WDW-XDV-428742				
QC Inspector					
Buyer	D. R. Whitworth		G1-59	X	X
PO File					
Vendor File					
CPO	D. L. Wegener		S7-01		
7. QUEST Codes					
Subject:		Cause:		Contr. Factor:	
8. Responsible Action Party: J. R. Weber			Org Code: 75230

Westinghouse Hanford Company		NONCONFORMANCE REPORT		1. Page <u>1</u> of <u> </u>	2. Preprinted No. 053250 QA Log No. CFQA 96 053250
3. P.O. W. O., or Job Control No. MDW-XDV-428142		4. System/End Use TANK FARM CHARACTERIZATION	5. Item/Material RADIOGRAPHIC EXAM SYSTEM	6. Dwg./Spec./Other No. N/A	7. Rev. N/A
8. Program/Project/Other N/A			9. Safety Class 350	10. ASME Code Items ☐ Yes ☒ No (If yes, notify authorized inspector)	
11. Supplier Name/Address V.S. TECHNOLOGIES 89 CROTON RD. BOHEMIA NY 11716-2903				12. Notification of Potential Occurrence Required ☐ Yes ☒ No	
13. Code: Lot/Heat/Serial N/A	14. Lot Size 1	15. Sample 1	16. Qty. Acc. 0	17. Inspection Criteria ☐ Dwg. ☐ Spec. ☒ Insp. Plan ☐ Other _____	
18. Item	19. Description of Nonconformance (list serial no. where applicable)			22. Disposition, Justification, and Instructions	
①	REQUIRED CONDITION: VERIFY THE PRESENCE OF THE INTERLOCK SWITCHES ON THE CAM-LOCK ADAPTER CARTRIDGES. ACTUAL CONDITION: TRAILER RECEIVED WITH NO RODS VISIBLE.			DISPOSITION: Move the x-ray imaging devices to the 306 Building for initiation of the Acceptance Test Procedures. The following deficiencies may be corrected at the test facility. 1. REWORK: The interlock actuating rods on system 004 are not in place in the cam-lock adaptor. The rods have apparently slipped down into the cabinet during shipment. The rods will be repositioned prior to re-running the ATP at the 306E Facility and its function verified as noted in the ATP (WHC-SD-WM-ATP-157, Rev. 0, Sections 5.2.2 and 5.2.3).	
②	REQUIRED CONDITION: RADIATION GENERATING DEVICE SIGNS/LABELS ARE INSTALLED ON ALL SIDES OF THE ENCLOSURE. ACTUAL CONDITION: RADIATION SIGNS SENT BUT NOT INSTALLED.			2. REWORK: The labeling (decals) provided on the cabinet meets the requirements of 21 CFR 1020.40. WHC goes beyond the requirements and adds additional "Radiation Generating Device" signs on all approaches/sides of the cabinet. These signs were provided but not	

20. Originator's Signature <i>George M. [Signature]</i>		Date <i>DEC 14, 95</i>		23. Design Document Change Required? ☐ Yes, Doc. No. _____ ☒ No	
21. Cognizant QA Manager's Signature <i>J.P. Sparker</i>		Date <i>DEC. 18, 95</i>		24. Corrective Action Required? ☐ Yes, No. _____ ☒ No	
App.	25. Cognizant Engineer <i>[Signature]</i>	Date <i>12/18/95</i>	26. Technical Rep. <i>NA</i>	Date	Signature/Org. <i>NA</i>
	QA Engineer <i>Don Board</i>	Date <i>12/18/95</i>	Signature/Org. <i>NA</i>	Date	Signature/Org. <i>NA</i>
Close	27. Accept ☒ Reject _____ Follow on NCR <i>NA</i> <i>[Signature]</i> <i>12-28-95</i> QA/C Personnel Date				

PURCHASE REQUISITION

Date: 2-3-95 Page 1 of 1

Buyer <i>D.H.</i>	428742	Ship To 1. Westinghouse Hanford Co. 2355 Stevens Dr. Richland, Washington 99352 ☐		Purchasing Clauses and Comments	
Vendor Telephone		2. Other			
Delivery Promise	Date	Code	F.O.B. ☐ ☐ Richland, Washington	Terms of Payment	
This Order Placed Orally On _____ With _____		Ship Via ☐ Prepaid ☐ Collect		Conf. ☐ Yes	Property Review
T of W ☐ A	LSSA ☐ B	DO ☐ C	B of A ☐ Q	RSS ☐ E	BPR ☐ F
QVAR ☐ G	C/P DATA ☐ H	SBSA ☐ I	DBSA ☐ J	BCA ☐ K	GOV. P ☐ L
PAT ☐ M	SLR ☐ N	HO ☐ O			

Principal Place of Performance:

City _____ State _____

Buyer's Signature *[Signature]* Date 2/22/95

Item No.	Qty	Unit	Product Code	Description	Unit Price	Total	Recycle Yes %
1	3	EA	6695	Provide a mounted mobile Core Sample Radiographic Examination System with all features and requirements per attachment. The Vendor shall submit a QA Program as per section 11.0 of this attachment. For data submittals refer to section 5.0 of the attachment. (P.R. Continued on Page 2)			
				NOTE: After Received deliver to: RE Layne, 305E/ DE Lab/ 6-5402/L6-36			
				EMERGENCY			
				SUGGESTED VENDOR: VJ Technologies, Inc.			
				89 Cardough Road			
				Bohemia, NY 11716-2903			
				APPROVAL: DOE-RL (516) 539-8800			
				RE: Myers / ATTN: Vijay Alreja			
				Approved: RE Raymond			

Authorized AC Metz	Bldg/Rm 1171/25	MSIN G4-05	Area 1100	Phone 6-6543	APPROVED BY (Print/Sign) Manager DW Hamilton	DATE 2/3/95	MSIN S7-12	PHONE 2-1130
Technical Questions Contact RE Robert / 12 Weber	MSIN RY-12	Area 200E	Phone 3-5316	Cog. Eng. JH Weber	DATE 2/3/95	MSIN S7-12	PHONE 2-5216	
Deliver To RE Robert	Bldg/Rm 227k/10	Area G4-05	Phone 1100	JW Lentsch	DATE 2/3/95	MSIN S7-15	PHONE 3-5252	
If Requisition Alteration, Provide ORIGINAL REQ. NO.	Emergency ☒ Yes	Safety RM Christensen	DATE 2/3/95	QA Engineer ML McElroy	DATE 2/3/95	MSIN S7-07	PHONE 3-5528	
CONTACT QA FOR ASSISTANCE IN COMPLETING THE BLOCKS BELOW				Financial Control ML McElroy	DATE 2/3/95	Cost Approval ML McElroy	DATE 2/3/95	
Approval Designator (Circle choice) E (3) (9) (0)	QA Clauses E12, E14, E17, F22, F34, H56	End Use Tank Farms	Characterization	Item ALL	CO ID W	Cost Center 75230	MC 110	Cost Element N4182
Safety-Class (Circle choice) 1 2 (3) 4	Approved Supplier req'd Surveyed To N/A	QA Review of Proposal ☒ Yes	ML McElroy	Program Code 2M482G	Total Estimated Cost \$850,000.00			
Source Insp. Req'd Plan Prepared By N/A	Receipt Insp. Req'd Plan Prepared By ML McElroy	Receipt Insp. Location Bldg. 1163	Phone 6-6360	Radioactive ☐ Yes	Hazardous ☐ Yes			

DISTRIBUTION: White - Purchasing Yellow - Quality Assurance Engineer Pink - Quality Assurance Goldenrod - Requisitioner

54-7600-001 (10/93)

[illegible]

[448] From: Donald C Board at ~WHC167 12/14/95 1:20PM (2122 bytes: 39 ln) 2
 To: George E Mata at ~WHC38
 cc James R Weber at ~WHC128
 Subject: NCR 053250 DISPOSITION

----- Message Contents -----

George,

Following is the disposition agreed upon.

Non-Conformance Report 053250
 Core-Sample X-ray Imaging Systems
 Number 004
 Purchase Order No. WDW-XDV-428742

- DISPOSITION Move the x-ray imaging devices to the 306 Building for initiation of the Acceptance Test Procedures. The following deficiencies may be corrected at the test facility.
1. REWORK: The interlock actuating rods on system 004 are not in place in the cam-lock adaptor. The rods have apparently slipped down into the cabinet during shipment. The rods will be repositioned prior to re-running the ATP at the 306E Facility and its function verified as noted in the ATP (WHC-SD-WM-ATR-157, Rev. 0, Sections 5.2.2 and 5.2.3).
 2. REWORK: The labeling (decals) provided on the cabinet meets the requirements of 21 CFR 1020.40. WHC goes beyond the requirements and adds additional "Radiation Generating Device" signs on all approaches/sides of the cabinet. These signs were provided but not attached due to the shipping schedule. They will be attached to the cabinet by WHC prior to field deployment. Reference NCR 053276, QA Log No. SSQA-95-008.
 3. REWORK: The printer for the cabinet has been previously shipped and is waiting for the trailer at the 306 Building. The printer shall be installed prior to initiating the Acceptance Test Procedure to be performed by WHC.

Thanks,

Don Board

APPENDIX 0

SAFETY INTERLOCK DRAWING 902E002, V.J. TECHNOLOGIES

0-2

APPENDIX P

VIDEO WIRING

12/1/95

APPENDIX Q

CENTER OF GRAVITY INFORMATION

APPENDIX R

SYSTEM CABINET VENTILATION SKETCHES

AIR-FLOW WITHIN XRI "MAIN" CABINET "FRONT CABINET"

XRI SYSTEM MAIN CAB CONTROL
CABINET COOLING
AND VENTILATION

8

AIR FLOW WITHIN XRI "MAIN" CABINET

"REAR CABINET"

APPENDIX S

REPLACEMENT HV GENERATOR AND POWER SUPPLY DATA

.

Westinghouse **ACCEPT**
Hanford Company

Insp. No. 6875

P.O.: 428715 Item: 1 Qty: 1 EA NCR: N/A
Safety Class: 3 CQ/PO No.: NA- -
Intended Use: X-RAY IMAGING CHARACTERIZATION

Spec/Dwg/Model/Pt No.: N/A

Rev.: N/A

Item Desc.: PHILIPS MG 165/4.5 HIGH STABILITY 150 KV--

Remarks: CONSTANT POTENTIAL X-RAY SYSTEM W/COMPONENTS

Inspected by: JPM 126

Date: 09/13/95

TO BE REMOVED ONLY BY QA PERSONNEL

54-8000-802 (02/83)

STEVENS

CH1346

WESTINGHOUSE HANFORD COMPANY LOC 12-33

3842

09/07/95

15:49:44

07 27 95

1 W-428715

2

71190

EMERGENCY

WDW-XDV-428715

VJ TECHNOLOGIES

LAST-RR-PRINTED

89 CARLOUGH RD
BOHEMIA

NY 11716-2903

1

IMPACT LEVEL 3

RICHLAND, WA

09/08/95

D R WHITWORTH G1-61

NET 10 DAYS

10 PREPAID

1 1 EA PHILIPS MG 165/4.5 HIGH STABILITY 150 53562.00
KV CONSTANT POTENTIAL X-RAY SYSTEM.
THE COMPONENTS OF THE SYSTEM WILL
INCLUDE:

- Revised* - CONTROL UNIT MGC 40, WITH CONTROL
CABLE & HOUSING
Revised - POWER SUPPLY MGP 41
Revised - HIGH VOLTAGE GENERATOR
Revised - HIGH VOLTAGE CABLE, 5M LENGTH,
STRAIGHT FLANGE CONNECTION
Revised - METAL-CERAMIC X-RAY TUBE MCN 165 OR
COMET MXR-160/0.4-3.0 (WITH FLANGED
ADAPTOR PLATE) FOCAL SPOT SIZE 0.4
& 3.0 MM
- TURMOIL MODEL OCN-33R WATER CHILLER

? - *Revised*

CF 237-541323

Garza #77

E12811-00

001-001 U W75230

110

N4182 100 BA VICKSTROM

H5-09

RCHN

INV# 6875

QCBKA1

(2cnt)

JR WEBER

S7-12

200E

RE LAYNE

306E/175A 300

00

THIS REQUISITION TO BE FILLED IN BY TYPEWRITER - DO NOT TYPE IN BOLD LINE AREA
REFER TO PROCUREMENT PROCEDURE NO. 1 OR CONTACT PURCHASING FOR ASSISTANCE IN PREPARING REQUISITION.

MAIL COMPLETED REQUISITION TO REQUISITION ADMINISTRATOR G1-68

Buyer		428715		PURCHASE REQUISITION		Date: 6-30-95 Page 1 of 2					
Vendor Code		Zip Code		Ship To		Purchasing Clauses and Comments					
Vendor Name				1. Westinghouse Hanford Co. 2355 Stevens Dr. Richland, Washington 99352							
Vendor Telephone				2. Other							
Delivery Promise		Date		Code		F.O.B.					
						☐ Richland, Washington					
This Order Placed Orally		Ship Via		Conf.		Property Review					
On		With		☐ Prepaid ☐ Collect		☐ Yes ☒ PM					
T of W		LSSA		OO		B of A					
A		B		C		D					
RSS		BPR		QVAR		C/P					
E		F		G		H					
SBSA		DBSA		BCA		GOV. P					
I		J		K		L					
PAT		SLR		HO							
M		N		O							
Principal Place of Performance:											
City				State							
Buyer's Signature						Date					
Item No.	Qty	Unit	Product Code	Description			Unit Price	Total	Recycle Yes	Recycle %	
1	1	EA		Philips MG 165/4.5 High Stability 150 kV							
				Constant Potential X-Ray System the components							
				of the system will include:							
				- Control Unit MGC 40, with control cable & Housing							
				- Power Supply MGP 41							
				- High Voltage Generator							
				- High Voltage Cable, 5m Length, straight flange connection							
				- Metal-ceramic X-ray tube MCN 165 or Comet MXR-160/0.4-3.0 (with flanged adaptor plate)							
				Focal spot size 0.4 & 3.0 mm							
				- Turmoil model OCN-33R Water Chiller 7.7 amp maximum, cooling hose length 20 Foot							
				- Water Flow Safety Valve							
				Continued on Page 2							
Author		Bldg/Rm		MSIN		Area		Phone			
BA Vickstrom		ETC-1/85		H5-09		RCHN		6-8959			
Technical Questions Contact				MSIN		Area		Phone			
JR Weber				S7-12		200E		3-5316			
Deliver To				Bldg/Rm		Area		Phone			
RE Layne		306E/175A		L6-36		300		6-5402			
If Requisition Alteration, Provide ORIGINAL REQ. NO.				Emergency							
				☒ Yes							
CONTACT QA FOR ASSISTANCE IN COMPLETING THE BLOCKS BELOW											
Approval Designator				QA Clauses				Catalog Cuts Attached			
(Circle choice) E ☒ S ☒ Q ☒ D				C02							
ity Class (Circle choice)				End Use				Characterization			
1 2 ☒ 4				X-Ray Imaging							
QA Approved Supplier				QA Review of Proposal							
Req'd Surveyed To				N/A							
Source Insp. Req'd				Receipt Insp. Req'd							
Plan Prepared By				Plan Prepared By							
N/A				POS							
DISTRIBUTION:				White - Purchasing				Yellow - Quality Assurance Engineer			
				Pink - Quality Assurance				Green - Requisitioner			

REPLACED INTO
UNIT #004

L. F. Arnold 6/30/95

KE Myers

APPROVED BY (Print/Sign)		DATE		MSIN		PHONE	
Manager RJ Blanchard		6/30/95		S7-12		3-1248	
Cog. Eng. TD Jarecki		6/30/95		S7-12		3-5741	
JW Lentsch		6/30/95		S7-15		3-5252	
Safety DC Rhodes		6/30/95		T7-37		3-7336	
QA Engineer MJ McElroy		6/30/95		S7-07		3-5588	
Financial Control		Date		Port Approval		Date	
Destination Delivery Date		8-10-95		Premium Transportation		☒	
☒ Mandatory		☐ Desired					
CO ID		Cost Center		MC		Cost Element	
ALL		W		75230		110	
Charge Code		N4182		Cost Estimate		\$55,000.00	
Program Code		DNFSB		Total Estimated Cost		\$55,000.00	
2N4B2G / 93-5 SI							
Receipt Insp. Location		Bldg. 1163		Phone 6-6368		Radioactive	
						☐ Yes	
						Hazardous	
						☐ Yes	

54-3000-282 (09/93)

■ High Accuracy

The MG 165 is a new generation 160 kV, 4.5 kW constant potential X-ray equipment, which has been designed for radiographic applications and dosimetry systems.

■ High Stability

The high voltage supply operates on 40 kHz which in turn ensures that the output high voltage is highly stabilized. The output is very reproducible not only for inspection cycles of minutes but also in the milliseconds range.

■ High Speed

The kV and mA values are continuously monitored thus ensuring that actual values are matched to the set values. Should a correction be necessary due to mains variation then the correction takes place within few microseconds.

■ High Comfort

The ability to change the high voltage value quickly can help to shorten inspection cycles. After initial switch-on the system will reach the desired high voltage within a maximum of two seconds. A typical change in selected high voltage e. g. from 100 kV to

140 kV can take place within less than 1 second. Because of the low stored energy within the high voltage generator, decrease of the high voltage is particularly fast. After switching-off the standard configuration at 160 kV/3 mA, the post-radiation drops to zero in less than 100 milliseconds.

The new microprocessor-based control unit MGC 40 is simplicity itself to operate. The set-up modes are menu driven. When in the operating mode the X-ray tube being used along with the focus selected are indicated in clear text. Four digit LED displays indicate kV, mA, focal spot size and time. Fault diagnosis of internal or external errors are displayed in clear text or alternatively by numerical code.

The MG 165 will drive any of the Philips metal-ceramic X-ray tubes rated at 160 kV thus providing an inspection solution to suit a variety of applications from low density composite materials through aluminium and steel products.

Technical Data (MG 165/4.5)

WHC-SD-WM-ATR-157 Rev. 0

Metal-ceramic X-ray tube MCN 165 (Dimensions in mm)

X-RAY SYSTEM MG 165/4.5

Metal-ceramic X-ray tube MCN 165

- Weight: 8 kg (17.6 lbs)
- Dimensions (Ø x h): 100 mm x 305 mm (3.9" x 12")
- Focal spot size: fine 0.4 / standard 3.0
- Max power: 0.64 kW / 3.0 kW
- Tube voltage: 7.5-160 kV
- Tube current: 4 mA / 19 mA at 160 kV
- Inherent filtration: 1 mm Be + 3 mm Al¹⁾
- Emergent beam angle: 40°
- Leakage radiation: < 2.5 mSv/h (18 nA/kg) with X-ray tube at full load, port closed, at 1 m (39.4") distance from the focal spot
- Coolant: water
max inlet temperature: 35 °C
min flow rate: 4 l/min

X-ray system operation

Constant current or constant wattage with automatic changeover, monitoring of the tube limit values

High voltage

- Range: 7.5-160 kV, 4 digit LED display
- Adjustment: 0.1 kV (adjustable by means of a magnetically retained incremental encoder)
- Accuracy: $\pm 1\%$ of set value ± 0.1 kV
- Reproducibility: $\pm 0.025\%$ of max kV value at const. temperature

¹⁾ 3 mm Al-filter removable by using tools

OR COMET MKR-160

- Display resolution: 0.1 kV
- H. V. Generation: two phase cascade circuit
- Ripple: 7V / mA, min 40 V (with 10 m H. V. cable), frequency 40 kHz
- Temperature drift: < 100 ppm / °C
- Insulation of the H. V. generator: oil

Tube current

- Range: 0-45 mA, 4 digit LED display
- Adjustment: 2 ranges, adjustable by means of a magnetically retained incremental encoder
Standard range:
0.05 mA steps from 0.5 mA up to 45 mA
Fine range:
0.01 mA steps from 0.0 mA up to 6 mA
- Accuracy:
Standard range:
 $\pm 0.2\%$ of set value ± 0.05 mA at const. temperature
Fine range:
 $\pm 0.2\%$ of set value ± 0.01 mA at const. temperature
- Reproducibility: (at const. temperature)
Standard range: $\pm 10 \mu\text{A}$
Fine range: $\pm 2 \mu\text{A}$
- Temperature drift: 50 ppm / °C

Exposure Timer

4 digit LED display, adjustable by means of a magnetically retained incremental encoder,

- Radiography:
in 1 sec steps up to 10 min
in 10 sec steps up to 99 min 50 sec
- Radioscopy
infinity position

Prewarning time

1-30 sec, menu driven adjustable in setup mode

Focal spot selector

Fine - standard focus selection push button with symbols and numerical indications

X-ray tube selector

Selection via key board

Programmed operation

- 100 techniques (kV, mA, time, focus), programmable via key board
- Three user selectable conditioning programs for idle periods up to 3 days, 14 days, or more than 2 weeks (may be bypassed)

Operating modes

- Mode 0: local manual operation
- Mode 1: local automatic conditioning
- Mode 2: local programmed operation
- Mode 3: local program input
- Mode 4: remote manual operation
- Mode 5: remote automatic conditioning
- Mode 6: remote programmed operation
- Mode 7: remote program input
- Menu driven setup mode: choice of Baud rate (300 up to 9600 Baud); choice of English, German, French or Spanish communications; special tube selection; prewarning time; test modes for service purposes etc.

Environmental conditions

- Duty cycle:
100 % up to +40 °C (+104 °F) ambient temperature in nonconvective air
- At operation
Temperature: -10 °C (+14 °F) up to +40 °C (+104 °F)
Relative humidity: 90 % at +40 °C (+104 °F)
- For storage
Temperature: -25 °C (-13 °F) up to +70 °C (+158 °F)

Technical Data (MG 165/4.5)

Relative humidity: 95 % at +40 °C
(+104 °F)

- Protection class: IP 33

■ Safety features

- Fail safe safety circuit (24 V_{DC}) acc to DIN 54113
- Additional safety circuit for 220 V_{AC}
- Safety circuit for automatic systems (24 V_{DC})²⁾
- H. V. generator primary interrupt (CDRII-switch)²⁾ (US standard)
- Monitoring (fail safe) of X-ray warning lamps
- Door locking contact²⁾ with monitoring External coolant flow switch²⁾
- Continuous internal diagnostics with automatic shutdown and fault display
- Automatic discharge of H.V. capacitors via postheating
- H. V. flange connections

■ System diagnostics

Diagnosis of internal and external fault conditions in clear text or numerical code on MGC 40 control unit

■ Mains supply

230 V +10 %, -15 %, single phase,
50 / 60 Hz, 50 A

■ COMPONENTS

■ Control unit MGC 40

- Dimensions (w x h x d):
483 mm x 133 mm x 300 mm
(19" x 5.25" x 11.8")
- Weight: 12.5 kg (29.8 lbs)

■ Power supply MGP 41

- Dimensions (w x h x d):
340 mm x 200 mm x 655 mm
(13.4" x 7.9" x 25.8")
- Weight: 45 kg (99.3 lbs)

■ High voltage generators MGG 42

- Dimensions (w x h x d):
375 mm x 335 mm x 625 mm
(14.8" x 13.2" x 24.6")
- Weight: 80 kg (176 lbs)

■ High voltage cable

length 5 m (16 ft.) standard, alternatively 10 m (32 ft.) / 15 m (48 ft.) / 20 m (64 ft.)

■ Water flow switch

with 10 m (32 ft.) cable

■ Cooling hoses

length on request

■ OPTIONS

- 100 kV - metal-ceramic X-ray tube MCN 101, focal spot sizes 0.4/1.5
- 160 kV - metal-ceramic X-ray tube MCN 166, focal spot sizes 0.4/1.5
- 160 kV - metal-ceramic X-ray tube MCN 167, focal spot sizes 0.2/3.0
- 160 kV - metal-ceramic X-ray tube MCN 168, focal spot sizes 0.3/0.3
- 160 kV - metal-ceramic X-ray tube MCF 160, focal spot size 1.0 x 3.0 (panoramic beam)
- Water cooler WL 3001, 3 kW
- Package cooler, 3 kW, 50 Hz

■ ACCESSORIES

- RS 232 C interface for MGC 40
- Tripod tubestand
- Mobile tubestand
- Laser beam finder
- Centring device and set of diaphragms for MCN 165, MCN 166, MCN 167, MCN 168 and MCN 101
- Mounting clamp for MCN 165, MCN 166, MCN 167, MCN 168, MCN 101 and MCF 160

Further accessories on request

■ REGULATIONS

- The products of Philips Industrial X-Ray are manufactured to highest safety, performance and quality standards, a few of which are:
- DIN 54113 X-ray tube leakage limits and safety requirements
 - IEC 336 focal spot measurement techniques
 - German radiation protection law of 1987
 - VDE German electric standards
 - DIN 40050 (IEC 529)
- The quality assurance system of Philips Industrial X-Ray GmbH is certified to

Technique chart MG 165/4.5 with
 MCN 165
 700 mm FFD,
 Pb screen: 0.02 mm above 100 kV,
 type of film G3, d=2
 focal spot size: 3.0

Wire penetrator sensitivity (WPS)
 of Fe (%)
 Distance focal spot-screen: 500 mm (19.7")
 Distance focal spot-object: 250 mm (9.85")
 7" image intensifier with Newvicon
 TV-camera
 focal spot size: 0.4

BEST AVAILABLE COPY

WHC-SD-WM-ATR-157 Rev. 0

ALTERNATE TUBE

METAL CERAMIC X-RAY TUBE ASSEMBLY

MXR-160

☐ 0.4 ☐ 3.0

State of the art technology and excellence in workmanship have been combined to provide the unsurpassed instrument for your advanced applications.

BEST AVAILABLE COPY

Tube assembly type

MXR-160/0.4-3.0

Nominal focal spot (IEC 336)

0.4 3.0

Target material

W

Target angle

20°

Radiation coverage

40°

Anode current at 160 kV, max.

1 mA 19 mA

Tube voltage, max.

160 kV

Tube power continuous, max.

540 W 3000 W

Filament current, max.

1 A 2.2 A

Filament voltage, max.

10 V 25 V

Cooling water flow, min.

4 l/min

Water pressure, max.

5 bar

Water temperature at inlet, max.

35° C

Inherent filtration, max.

1 mm Be

Radiation leakage, max.

250 mR/h

Weight

8 kg

BEST AVAILABLE COPY