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PROTOTYPICAL ROD CONSOLIDATION
DEMONSTRATION PROJECT
PHASE III FINAL REPORT
VOLUME I OF IV
COLD CHECKOUT TEST REPORT
BOOK 2 OF 9

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DEPARTMENT OF ENERGY
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DOE PROTOTYPICAL ROD CONSOLIDATION PROJECT PHASE III FINAL REPORT
PREFACE

The Phase III Final Report for the Prototypical Rod Consolidation Demonstration Project is divided into four volumes as described below:

- Volume I - Cold Checkout Test Report (9 books)
- Volume II - Design Description (2 books)
- Volume III - Drawings (Supplied separately per contract as
 ↓ Not blue-line copies, reproducible mylars
 included and 35mm aperture cards)
- Volume IV - Operations and Maintenance Manual (5 books)

Each book of Volumes I, II, and IV contain the Table of Contents for all books of the volume.

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FUEL ROD EXTRACTION SYSTEM

(WBS 1.3.2.2)

TEST RESULTS AND ANALYSIS REPORT

1.0 INTRODUCTION

This appendix addresses the System Operational Testing (SOT) for the Rod Extraction System (Ref. SOT Test Procedure 9315-TP-201, Attachment 1 to this appendix). It provides an overview of the function of the equipment, procedures used during testing, results obtained, and conclusions and recommendations. The purpose of the SOT was to verify that the as-built condition of the system met or exceeded the associated performance requirements. The primary objectives of the testing were as follows:

- o Verification of pull head drive carriage M-107A and M-107B operations.
- o Verification of pull head gripper operations.
- o Verification of the pull head/clamping table interface.
- o Verification of pulling forces.

Note that Test Procedure 9315-TP-202 also demonstrated Clamping Table interface with the pull heads, and Test Procedure 9315-TP-207 demonstrated interface with the Side Transfer, Rod Compaction, and Rod Loading Systems.

In all cases, the Rod Extraction System has been judged acceptable and was released for normal Integrated System Testing (IST).

2.0 EQUIPMENT FUNCTION

The Rod Extraction System (Ref. Dwgs. 9315-M-2204 through 2217) is one of several systems mounted to a common base that work in unison to remove the rods from the fuel assemblies, reconfigure the rods into a selected shape, and load them into a canister. The extraction system, side transfer mechanism, rake assembly, hopper loading system, and the rod loading system are all mounted to the Consolidation Table.

The Rod Extraction System is designed to remove a complete row of fuel rods from either two PWR or four BWR fuel assemblies. The fuel assemblies are positioned and restrained by the Clamping Table during the extraction cycle. Two pull head assemblies are provided for PWR fuel types. Four pull head assemblies, two for each pull head drive, are provided for BWR assemblies. Pull heads are specific for the number of rods in the fuel row. Thus, for PWR fuel assemblies, sets of two pull heads with 15 and 17 grippers are provided. For BWR fuel assemblies, a set of four pull heads with 8 grippers each is provided.

Each pull head grips an entire row of fuel rods in one fuel assembly and withdraws them to a position where the rods are released. Intermediate hold point positions are provided to verify the start of rod extraction and the completion of rod extraction. When the rods are released, they fall onto a set of rails on the Consolidation Table. The rods are then side transferred from under the pull head drives. When the Clamping Table has indexed to the next rod row, the pull heads are extended to grip the next row of rods in the fuel assembly.

Each pull head drive is driven by a servo-motor (M-107A and M-107B) and is equipped with an integral resolver (GE-107A and GE-107B) and a gear reducer. End-of-travel proximity sensors are provided for each drive (ZE-107A/B for drive A and ZE-107C/D for drive B). The Rod Extraction System is designed for pull loads of up to 3400 lbs. on each drive. This is based upon the maximum extraction force of 200 lbs. per rod and the pulling of 17 rods per row from each of two W 17x17 fuel assemblies.

The grippers are designed with two opposing jaws, one located above the other. The two jaws have a common pivot, but the lower jaw does not move relative to the upper jaw. The gripper is operated by a small DC gear motor. The pull head assemblies have two motors for BWR fuel types or four motors for PWR pull types. Each jaw motor drives three, four, or five grippers, depending upon the fuel type.

A gripper in each jaw is also equipped with a load cell (WE-107A through WE-107H) to monitor the pulling forces exerted by the pull heads. Pulling forces are indicated and recorded during the extraction operation. The pull head grippers are initially designed to provide 160-200 lbs. of pulling force per rod. Calculations indicate that up to 1000 lbs. of pulling force may be safely applied to degraded rods.

The Rod Extraction System must interface with the Clamping Table and Rod Compaction System. The critical interface is the alignment of the rod grippers and the rod ends on the Clamping Table. The Clamping Table positions the rod ends to within 0.020 inch in the north/south direction and 0.010 inch in the vertical direction. However, residual stress can bow individual rods out of the theoretical spacing. It is assumed that a rod can bow sufficiently to touch an adjacent rod. This allows up to 0.080 inch of deflection. The grippers are designed to accommodate up to ± 0.125 inches of misalignment with the fuel rod ends, in the north/south and vertical directions.

The ± 0.125 inch misalignment tolerance provides for the 0.020 inch

out-of-position tolerance for the vertical direction on the Clamping Table, 0.080 inch of fuel rod deflection, and the ± 0.005 inch repeatability of the Clamping Table vertical positioning. The opening to the grippers is provided with generous lead-ins in both directions, to ensure that misaligned fuel rods are guided into the throat of the gripper. This design is capable of processing fuel assemblies which have a 1.5 inch bow.

3.0 TEST PROCEDURE

The record copy of the test procedure (Document 9315-TP-201) is provided as Attachment 1. This procedure defines the requirements and step-by-step instructions for qualifying the Rod Extraction System for Integrated System Testing (IST). This testing has been divided into the following sections, repeated for each of the five fuel types utilizing fuel specific software.

- o Verification of pull head drive end-of-travel proximity sensor operation.
- o Verification of pull head drive M-107A and M-107B drive operation.
- o Verification of carriage drive system operations under worst case load conditions.
- o Verification of gripper performance in groups and individually.
- o Verification of system interlocks.
- o Verification of Rod Extraction System SINGLE and AUTO modes of operation.
- o Verification of alignment and extraction operations for normal fuel assemblies and for bowed fuel assemblies.
- o Verification of servo-drive fault responses.

The test results and data for each of these test sections are contained within the record copy of the test procedure (Ref. Attachment 1). Section 4.0 of this volume provides a typical format for the test procedure and includes an explanation and reference as to the location of the test data included in the various sections of the test procedure. Completed test steps have been signed by appropriate personnel as required for final disposition of this SOT.

Two processes were implemented for making all necessary changes to the official test procedure and/or equipment. The first process is called a Temporary Procedure Change Notice (TPCN). The TPCNs were used to make changes to the test procedure. During this test procedure, 13 TPCNs were issued as follows:

- o TPCN #1 deleted testing for W 15x15, B&W 15x15, CE 14x14, and GE 8x8 fuel types for the refocused Phase III test program.
- o TPCN #2 deleted the measurement requirements for motor torque from the test procedure. Test Acceptance Criteria (TAC) Change Notice 001 deleted this criterion from the TAC. Torque measurements were not obtained.
- o TPCN #3 revised acceptance criteria for the first rod extraction hold point position from $6.0 \pm .25$ to $1.0 \pm .25$ inches.
- o TPCN #4 completed testing for criteria revised as per TAC Change Notice 001 for criteria which were not initially demonstrated and for open repair log items.
- o TPCNs #5, 6, 7, 9, 10, 11, 12, and 13 implemented minor corrections to the test procedure.
- o TPCN #8 was issued to delete steps which sought to obtain the design extraction speed and time since the adjustments required would be too great for the current design.

Each TPCN identified the change, reason for change, and final disposition for approval of the test results. A copy of each TPCN is included in Attachment 1.

The second process is an Exception/Repair Log (ERL). The ERLs were used to document either fixes to the equipment to meet acceptance criteria or to justify acceptance of the test results that did not meet the test criteria. For this test, 47 ERLs were issued as follows:

- o ERLs #1 and 11 addressed prerequisite issues.
- o ERLs #2, 4, 6, 7, 9, 13, 16, 17, 18, 21, 22, 23, 26, 27, 28, 29, 30, 33, 34, 37, 38, and 43 were issued to implement fixes to the equipment to meet the acceptance criteria or other requirements.

- o ERLs #3, 5, 12, 19, 25, 31, and 41 were issued to document the failure to meet acceptance criteria.
- o ERL #10 addressed the use of the wrong repair log forms. The forms issued with the procedure do not have the completion section. The existing forms are annotated to close the repair log entries.
- o ERLs #8, 14, 15, 20, 24, 35, 36, 39, 40, 42, 44, and 45 were issued to deal with administrative issues.
- o ERL #32 was issued to document equipment damage during testing. Testing as per TPCN #4 resulted in an accident which damaged an electrical connector on pull head drive A. A piece of unistrut left on the Rod Extraction System frame caused the damage. A temporary repair was made. No further repairs were made in Phase III.
- o ERLs #46 and 47 were issued to accept test results that did not meet the acceptance criteria.

Each of these ERLs identified a problem encountered during testing, the proposed solution to the problem, and the final disposition (accept as is or fix) to close out the ERL. A copy of each ERL is included in Attachment 1.

If a change to the acceptance criteria was required, a Test Acceptance Criteria (TAC) Change Notice (TCN) was issued against the TAC document. A TPCN would then be issued to reflect changes to the procedure. For this procedure, one TCN was issued against the TAC. The TCNs issued against the TAC documents can be found in the Test Section of the QA Records Package, which is a Phase III deliverable.

4.0 TEST RESULTS

The design and operating parameters for the Rod Extraction System are dependent on both the type of fuel being processed and manufacturer of the fuel. However, due to the restructuring of the test program, only those test procedure sections (Ref. TPCN #1) required to qualify this equipment for processing W 17x17 fuel assemblies were performed. The following sections provide a discussion of the results obtained during this SOT.

Prior to initiating this test, a list of prerequisites (Ref. Section 2.0 of Attachment 1) had to be satisfied. These prerequisites identified all of the requirements for initiating this test sequence and served as an informal Operational Readiness

Review (ORR). As a result of this informal ORR, it was determined that all of the requirements except one had been satisfied.

For prerequisite 2.15, CCTV camera 7 was not installed at the start of testing; therefore, ERL #1 was prepared. Based on an evaluation of the system by the test conductor and a review of the subsequent prerequisites by the review committee, it was determined that the system testing could begin without the camera. The camera would be installed during testing. The lack of the camera would not affect the operation of the equipment or the validity of the test results for initial testing. Therefore, testing of the Rod Extraction System was initiated.

However, the Factory Acceptance Test (FAT), completed prerequisite 2.9 was signed off based on the partial completion of the FAT. The FAT was completed sufficiently for SOT testing. ERL #11 was prepared after the start of testing to document the exception. The FAT's testing of proximity sensor setpoint and Cable Management System function was not performed. The function of the proximity sensors is demonstrated for JOG mode operations in the SOT. The Cable Management System was completed for the SOT, and the system functioned as designed during the performance of the SOT.

Prerequisite 2.7 for the completion of the Control System SOT checklist for the Rod Extraction System was signed off before the start of testing. This verification was made based on partial completion of testing after the initial process control equipment setup was performed, that is, the formal SOT of the eight gripper motors, eight pulling force load cells, and four pull head drive proximity sensors had not been completed. No ERL was prepared to document the discrepancy. This procedural discrepancy was subsequently evaluated by the review committee, and no significant test-results impact was identified.

- o Gripper Motor Testing

The gripper motor testing consisted of driving each gripper motor to each end-of-travel and observing indications. No ERLs were identified. This test sequence had no impact upon the validity of the SOT, and will have no impact on the IST.

- o Pulling Force Load Cell Testing

During testing of the pulling force load cells, it was recognized that completion of the requirements could be performed in the same time frame as the SOT. Both test procedures sought to verify accuracy of indication but

with differing criteria. The fact that testing was not fully completed for this system was recognized at this time. The discrepancy with the prerequisite was not recognized at this time. No ERL was prepared.

Pulling force indication testing was not successfully completed as described below. Control System testing was completed after the closure of this SOT. This test sequence had no impact upon testing validity since testing of these load cells could not be satisfactorily completed in this phase. The remaining problems with the pulling force load cell will have an impact on the IST, but this discrepancy will not. For the IST's acceptance criteria, the reported data must be accurate.

o Pull Head Drive Proximity Sensor Testing

The pull head drive proximity sensor testing consisted of checking calibration of set points for each proximity sensor. The proximity sensors still operated. No ERLs were identified. This test sequence has no recognized impact upon testing validity. Since the IST does not actuate the proximity sensors, no potential impact on the IST is identified.

4.1 VERIFICATION OF PULL HEAD DRIVE END-OF-TRAVEL PROXIMITY SENSOR OPERATION

This test sequence consisted of actuating each end-of-travel proximity sensor to verify that it performed its intended function. The purpose of this test sequence was to verify that the equipment properly responded to the sensor signal and/or that the proper signals were registered at the Control System. Each test was repeated a minimum of three times to ensure consistency.

Each pull head drive M-107A and M-107B is provided with proximity sensors at each end of travel. The purpose of these sensors is to deactivate the drive motors either in a fault (motor runaway) condition or in the event of overtravel in the JOG mode. This test sequence consisted of placing each drive system (one at a time) in JOG mode and operating them in each direction of travel until the motor was deactivated. Once the motor stopped, it was verified that the switches had deactivated the motors prior to engaging a hardstop and that the proper signal and error messages were received at the Control System.

The speed set point for the pull head drives was initially set at 31,100 cps. Testing as per Sections 8.1.1.1 and 8.1.1.2

demonstrated that, at a reduced JOG speed set point of 10,000 cps, and at 50% of this limited JOG speed, the proximity sensors operated to stop the motor, that the Control System indicated this end-of-travel condition, and that the hardstops were not contacted.

After evaluation, TPCN #4 was prepared to test proximity sensor function at 100% of a further limited JOG speed. Since the proximity sensors are located as required for range of travel in Phase III, the available JOG speed must be adjusted to work with this limitation.

TPCN #4, Section 8.2 testing reduced the JOG speed set point from 10,000 to 5,000 cps (to roughly 30 ipm) and demonstrated these criteria for 100% JOG speed operations. This provides adequate protection against operator error while operating in the JOG mode.

The hardstop criteria are not demonstrated in Phase III testing for HAND, SINGLE, or AUTO modes. In these programmed mode operations, the motor operates between set points at programmed speeds (31,133 cps, nominally 181 ipm after acceleration). The proximity sensors are used as a backup for a motor runaway fault or other failure. This feature, in turn, is backed up by the use of hardstops which prevent equipment damage and allow overcurrent protection to shut down the motor at the hardstop.

The design intent that the proximity sensors provide a line of defense against motor runaway is not implemented in Phase III. Proximity sensors cannot be located so that they provide protection at 100% speed and still allow the required operations to be performed. As implemented, a runaway pull head drive can coast past the proximity sensors and may contact the hardstops. This issue may be resolved in Phase IV by the addition of motor brakes or by another correction in a later phase.

In each case, the end-of-travel proximity sensors performed adequately for limited JOG speed operations. Therefore, each was judged acceptable for continuing on to the next series of tests. The lack of proximity sensor design function in programmed modes of operation will not have an impact upon the IST since the proximity sensors are not used in routine operations.

4.2 VERIFICATION OF M-107A AND M-107B PULL HEAD DRIVE OPERATION

This test sequence consisted of operating each pull head drive (one at a time) through its full programmed range of motion. The purpose of this test sequence was to verify that each of the drive systems functioned as designed. The primary objective was to demonstrate the positioning accuracy and repeatability of these

drive systems in meeting their requirements. Secondary operating parameters of torque and travel time were also to be evaluated.

However, the accuracy of power monitor used to measure the drive system torque became suspect when testing other systems. When the manufacturer of this device was contacted about the problem, HALLIBURTON NUS was informed that the monitor would not work on brushless pulse width modulated motors such as those used in this design. Therefore, all torque data collected were not valid. Further conversation revealed that no instrumentation exists at this time which could be used for this purpose. An engineering evaluation was conducted as a result of this new information to determine the importance of measuring this parameter.

It was decided that since the drive systems were conservatively sized, were being tested under loaded conditions (Ref. Sections 8.1.3 of the test procedure), and were being tested under simulated conditions (reference sections 8.1.2.1 and 8.1.2.2 of the test procedure), all problems with the drive systems would be flushed out. Therefore, the criterion to measure the motor torques was eliminated from the SOT procedure (Ref. TPCN #2).

The test sequence for verifying the operation of each of the pull head drives was identical. Each drive system was placed in the HAND mode of operation and operated from control set point to set point in each direction of travel. The distance traveled was measured and recorded in the test procedure (Ref. Attachment 1). During the rod extraction motion between the first and second hold points, elapsed time was also measured. This was done a minimum of three consecutive times to establish repeatability. The results of this testing for each of the drive systems are as follows:

- o The first hold point to verify the partial extraction of the rods occurs at 6.0 +/- 0.25 inches from the grip rods position.

The original criterion was that the first hold point be at $6.0 \pm .25$ inches. This hold point was to verify that all rods were being pulled. TPCN #3 revised the criterion to $1.0 \pm .25$ inches for the test procedure to prevent the pulling of the rods past the first grid in the fuel assembly and to allow for pushing the rods back if a second attempt at gripping was required. TCN 001 revised the TAC's acceptance criterion to $1.0 -.25/+1.0$ inches to allow increase if required for camera coverage. However, the set point was not subsequently revised and no retesting was required. Therefore, no revision to TPCN #3 was prepared.

The pull head drives were initially positioned at the grip rods position. Then, operating in the HAND mode, the pull head drives were retracted to the first hold point position and the travel distance was measured.

Testing as per Sections 8.1.2.1 and 8.1.2.2 demonstrated that the first hold point was at 1-1/16 or 1-1/8 inches over three repetitions for each pull head. The indicated travel is 1.164 inches as per TPCN #4 testing. This revised criterion was demonstrated for both pull head drives.

- o The second hold point to verify the complete extraction of rods occurs at 176.0 +/- 0.25 inches from the grip rods position.

The pull head drives were initially positioned at the first hold point. Then, operating in the HAND mode, the pull head drives were retracted to the second hold point position and the travel distance was measured.

Testing as per Sections 8.1.2.1 and 8.1.2.2 demonstrated that the second hold point was at 176-1/8 inches over three repetitions for each pull head. The indicated travel is 176.019 inches as per TPCN #4 testing. This criterion was demonstrated for both pull head drives.

- o The third hold point to verify the release of rods occurs at 180.0 +/- 0.25 inches from the grip rods position.

This is an added criteria in the test procedure and is not addressed in the TAC.

The pull head drives were initially positioned at the second hold point. Then, operating in the HAND mode, the pull head drives were retracted to the third hold point position, and the travel distance was measured.

Testing as per Sections 8.1.2.1 and 8.1.2.2 demonstrated that the third hold point was at 180 to 180-3/16 inches over three repetitions for each pull head. The indicated travel was 180.092 inches as per TPCN #4 testing. This criterion was demonstrated for both pull head drives.

- o The maximum drive speed is < 120 to 130 inches per minute in the extraction operation.

The original criterion required that the peak rod

extraction speed be 120 to 130 inches per minute. This TAC requirement was based on the Phase II Final Design Report's description of extraction operations. However, this was not a critical parameter. Throughput was generally limited by the performance of the cutting system. Rod extraction timing (or pull head drive speed) was only of interest for the last batch. IST 215A will record whole-cycle timing under actual extraction operations.

Testing as per Section 8.1.2 attempted to demonstrate the original 120 to 130 ipm criterion. However, the procedure was not prepared to capture peak speed. It captured average speed data through end-to-end time measurement. The travel time between the first and second hold points was measured while operating in the HAND mode. Average speed was about 58 ipm. ERL #12 was prepared for this discrepancy.

TAC Change Notice 001 revised the criterion to reflect time study analysis calculation estimates for an average speed of 181 ipm. The revised travel distances because of the change in the first hold point's position set point was addressed. This resulted in a timing requirement of ≤ 0.97 minute. TPCN #4 was prepared to demonstrate this revised functional criterion as; "Rod extraction between the second and third hold points takes $\leq .97$ minutes with an average speed of ≥ 181 inches per minute."

The existing programmed speed set points determined in TPCN #4 testing were 25,000 cps for extension and 10,000 cps for retraction of the pull head drives. The initial setup as per Appendix A indicated the design motor speed was at 31,133 cps. The motor speed set point values had been reduced from the initial design value during further setup.

TPCN #4 testing determined that the HAND mode average speed, after resetting to the design value of 31,133 cps, between the first and second hold points was slightly greater than 100 ipm. This was significantly less than the desired 181 ipm average speed.

In initial testing as per Step 8.1.9 of TPCN #4, operating times were noted. The pull head drive accelerated smoothly over a period of several seconds, operated at speed, then decelerated over a period of

several seconds. The actual periods of acceleration and deceleration were not measured but were on the order of 5 seconds as indicated by sound. The speed after acceleration was not measured by TPCN #4, but the FAT demonstrated that the value was about 181 ipm with the JOG speed setpoint of 31,100 cps. The acceleration and deceleration ramps had a significant impact on the average speed.

This discrepancy between speeds was too great to eliminate by the adjustment of speed and motor parameters. It would require an approximate doubling of the motor speed to obtain the desired average operating speed. The acceleration ramps, and perhaps the acceleration time constant, would require re-tuning, and this would have an unknown effect upon rod extraction operations. A high acceleration rate could jerk the gripper from the rod. Such work can only be accomplished under design operating conditions with fuel assemblies in place.

ERL #25 was prepared to address the discrepancy. TPCN #8 eliminated the procedural attempt in retest TPCN #4 to obtain the desired operating speed. The revised functional criterion was not demonstrated in Phase III.

TPCN #4, Section 8.4 concluded that the actual operating times for the Rod Extraction System alone did not exceed the allocated times set by the estimated fuel preparation times, that is, with the times observed, the fuel preparation process remained the critical path until the last assemblies were prepared. This evaluation did not include actual times for fuel preparation, RBT operations, or rod compaction/loading operations. Based on this evaluation, the processing of the last fuel assemblies of the batch will add only a few minutes (≥ 100 seconds) to the batch processing time.

4.3 VERIFICATION OF CARRIAGE DRIVE SYSTEM OPERATIONS UNDER WORST CASE LOAD CONDITIONS

This test sequence consisted of operating the pull head drive motors under maximum design load. The purpose of this test was to verify that each drive system was capable of producing the force required to meet its design function.

Static load testing was performed since it was impractical to perform dynamic load testing over distance as would be experienced

in a rod extraction operation. A load cell was fixed to the Clamping Table and was connected by cable to each pull head drive.

This load test consisted of driving the pull head drive away from the fixed load cell test fixture in the JOG mode until a value of over 3400 lbs. was indicated. With the force applied, rail deflection measurements were obtained using a dial indicator. Motor torque measurements were deleted as per TPCN #2 as described above. Then, the force was removed and the drive system and rails were inspected for damage.

Testing as per Section 8.1.3 demonstrated that each pull head drive carriage was able to produce > 3400 lbs. of pulling force; that the rail deflections were less than 0.06 inch (M-107A readings summed to 0.003 inch, M-107B indicated no deflection); and that no resulting damage was observed.

However, the dial indicator used for measurements was not demonstrably calibrated. ERL #8 was generated and the calibration was subsequently verified to be accurate. TPCN #5 added the calibration block to the test procedure.

The rod extraction pull head drives performed as designed meeting all acceptance criteria.

4.4 VERIFICATION OF GRIPPER PERFORMANCE IN GROUPS AND INDIVIDUALLY

o Gripper Performance in Groups

The purpose of Section 8.1.4.1 was to demonstrate gripper performance when operating with other grippers. Specifically, it sought to verify that each gripper was able to produce from 100 to 200 lbs of pulling force without slippage.

A force gauge was connected sequentially to a test rod in each gripper position. Test rods were also placed in all other gripper positions. The pull head drive was operated in the JOG mode to apply the test force. Two test sequences were performed for each pull head's grippers.

Initial testing obtained two readings for M-107A grippers which exceeded the 200 lb upper limit. Initial testing was performed with the rods fully inserted. A 1/2 inch insertion was required to obtain acceptable values in the second cycle of testing as required by the test

procedure. Insertions of greater than 1/2 inch increased the pull force before slippage. ERL #2 was prepared, limiting insertion to the design maximum of 3/4 inch. The second cycle of testing, performed with the design insertion length, obtained pulling force values of between 100 and 195 lbs. for M-107A and between 110 and 190 lbs for M-107B.

TPCN #4 was prepared to obtain additional data related to the effects of insertion length up to the new maximum of 2 inches (0.5 design + 1.5 offset) on pulling forces. Mechanical methods were used to apply force since JOG mode operations tended to be poorly controlled. Testing as per TPCN #4 showed no indication that pulling forces were significantly increased with increasing insertion length up to a maximum of approximately 1-1/4 inches for the worst-case gripper tested. This testing was performed with the new gripper inserts in place to limit insertion length. Informal observation indicated that the gripper inserts did not reduce the available gripping force at design insertion lengths.

TPCN #4 testing obtained a 140 lb. pulling force for the selected gripper which had previously demonstrated a 195 lb. force in initial testing. This may be the result of different methodology or other uncontrolled variable.

The actual insert's limitation was approximately 1.75 inches as observed in testing. The actual available insertion lengths were not measured.

This criterion was demonstrated for all 17x17 grippers.

It is noted that a different design of the pull heads could obtain a 160 to 200 lb. pulling force independent of the operation of the other jaws in the pull head.

o Gripper Performance Individually

The purpose of Section 8.1.4.2 was to demonstrate gripper performance when operating independently of other grippers. Specifically, it sought to verify that each individual gripper was able to produce from 160 to 200 lbs. of pulling force without slippage.

A force gauge was connected sequentially to a test rod in each gripper position. Test rods were not placed in all other gripper positions. The pull head drive was

operated in the JOG mode to apply the test force. Two test sequences were performed for each pull head's grippers.

Initial testing obtained data over two cycles for each pull head. The data ranged from 140 to 195 lbs. Twelve of the 68 readings performed were below the 160 lb. criterion. ERL #3 recommended that the lower limit be reduced to 140 lbs.

This recommendation was not implemented in Phase III testing; and no TAC Change Notice was prepared. Rather, this failure was carried as an open item for Phase IV. Test results were adequate to support performance of the IST for normal operations.

Testing as per TPCN #4 readdressed this issue in the comparison of pulling force indications and actual pulling forces. TPCN #4 was prepared using a 140-200 lb. pulling force objective with all grippers loaded. ERL #24 to TPCN #4 reported that a pulling force of about 135 lbs was observed before slippage. TPCN #4 should have been prepared using the 100 to 160 lb. criterion. The exception was dispositioned by TPCN #7 and this entry in the Test Results and Analysis Report. TPCN #4 testing was subsequently performed using the 100 to 160 lb. criterion.

The TAC was prepared using two pulling force criteria. Pulling forces for single rods only were to be 160 to 200 lbs. and 100 to 200 lbs. for multiple rods. This addressed the current design. A better design would be able to accomplish the original design intent of 160 to 200 lbs. independent of the presence of other rods.

This criterion is not demonstrated in Phase III. However, this does not inhibit the performance of the IST.

4.5 VERIFICATION OF SYSTEM INTERLOCKS

This test sequence consisted of setting up various interface conditions for the Rod Extraction System. Once these conditions were set up, an attempt was made to operate the affected drive through its range of motion. The purpose of this test was to verify that the drive systems would operate only when a predefined set of conditions was satisfied. This test consisted of either applying or not applying various interface conditions through

temporary changes in the Control System data registers. Once these interface conditions were set up, an attempt was made to operate the appropriate drive system in the HAND mode. This test series continued until every practical combination of these interfaces was tested to verify that each drive system would operate only under the proper conditions.

During this test, two drive system operations were tested as follows:

- o Rod Extraction pull head A (FWD) was successfully tested for the two interface conditions of the grippers being open and the side transfer retracted.
- o Rod Extraction pull head B (FWD) was successfully tested for the two interface conditions of the grippers being open and the side transfer retracted.

It was noted that the gripper-open interlock only interlocked the pull head drive that had the closed gripper. The other drive was not interlocked and would be driven forward while the interlocked drive was faulted. This could complicate subsequent automatic sequence operations because of the difference in pull head drive positions. Both pull head drives should remain in the same relative position.

Based on the results of the testing performed on the software interlocks, the Rod Extraction System was judged to be acceptable for continuing on to the next series of tests.

TPCN #4 testing determined that an additional interlock had been programmed in Phase III design development. This interlock required that the Rod Compaction System be in the AUTO mode before programmed mode operations may be performed on the Rod Extraction pull heads. This interlock inhibits human error when each system is operable from separate consoles because separate operators could start to drive each system at the same time. Thus, a collision between the side transfer and the pull head is inhibited in parallel operations. No TPCN or TAC Change Notice was prepared for this revised logic. TPCN #4 observations are sufficient to demonstrate the interlock. The affected operating procedure has been updated for this interlock. No additional action is required.

4.6 VERIFICATION OF ROD EXTRACTION SYSTEM SINGLE AND AUTO MODES OF OPERATION

This test sequence consisted of operating the Rod Extraction System in both the SINGLE mode and AUTO mode of operations. The purpose

of these tests was to verify that the operating sequence for each system was correct and that the proper hold points were implemented. Each test executed all process steps from extending the pull head drives to releasing the rods.

In each test the equipment operated as designed with only minor problems. Section 8.1.6.1 demonstrated operations in the SINGLE mode; while Section 8.1.6.2 demonstrated operations in the AUTO mode. TPCN #5 deleted Steps 8.1.6.2.1 and 2 since the system was already configured from previous testing as required by these steps. This had no impact upon test validity.

These sections demonstrated the following specific criteria:

- o At the start of the sequence, the gripper jaws on pull heads A and B open.

TAC Change Notice 001 corrected the sequence in the TAC to reflect the fact that the grippers were open at the start of the sequence and that the first step in the sequence was the extension of the pull heads to the grip rod's position. No TPCN was required for the procedure since "open" means both a condition and an action. Testing demonstrated that the gripper jaws were open at the start of the sequence.

- o Pull heads A and B are fully extended (West).

Testing demonstrated that the Rod Extraction pull head drives M-107A and M-107B extended to the grip rods position in the expected sequence.

- o Gripper jaws on Pull Heads A and B close.

This criterion was not specified in the TAC, but it is a required part of the sequence. TAC Change Notice 001 was prepared to add this missing step to the TAC. Testing demonstrated that the Rod Extraction gripper jaws M-107C to M-107J closed at the grip rods position in the expected sequence.

Testing as per TPCN #4 subsequently indicated that a delay was required after the closing of the grippers on the rods before proceeding to extraction operations. This delay was required to allow the Process Control System to reset the pulling force "tare weight" indications. The gripping of the fuel rods produced a loading effect on the pulling force load cells. It took

a few seconds for relaxation or equalization to occur so that a reasonable "zero" force indication was available prior to extraction. The current implementation required a 10 second delay. However, no action was taken to program a fixed delay time in Phase III.

- o Pull heads A and B were retracted (east) to the first hold point at 6.00 +/- 0.25 inches and the motors stop.

The original criterion was that the first hold point be at $6.0 \pm .25$ inches. This hold point verified that rods were being pulled. TPCN #3 revised the criterion to $1.0 \pm .25$ inches for the test procedure. TAC Change Notice 001 revised the TAC's acceptance criterion to $1.0 - 0.25/+1.0$ inches to allow increase if required for camera coverage. The set point position was previously demonstrated in Sections 8.1.2.1 and 8.1.2.2.

Testing demonstrated that the Rod Extraction pull head drives retracted to the first hold point in the expected sequence. The dimension was previously verified.

- o When "CALL CAMERA" is actuated at this first hold point, video images from cameras 7 and 8 are displayed on the monitors.

Testing demonstrated that the "CALL CAMERA" function at the first hold point produced images from cameras 4 and 7. This represents an error in the TAC and the test procedure, and ERL #4 was prepared.

It was subsequently determined that cameras 4 and 8 did not provide adequate coverage to verify this hold point. Camera 8 was incorrectly located to perform this function. Camera 4 could not see the east end of the rods at this hold point. Neither camera provided lower clamp coverage. Camera 3 was correctly located to provide lower clamp coverage, while camera 7 was located to provide coverage of the upper clamp. TAC Change Notice 001 was prepared to revise the camera numbers to cameras 3 and 7.

TPCN #4, Section 8.3 was prepared to retest for the revised camera selection. Testing demonstrated that cameras 3 and 7 were selected by the camera call at the first rod extraction hold point.

- o Camera pan, tilt, and zoom are functional.

Initial testing verified that camera pan, tilt, and zoom controls were functional but did not document the testing. TPCN #4, Section 8.1 explicitly demonstrated that all camera controls were functional for cameras associated with the Rod Extraction System.

- o A clear unobstructed view of the lower clamp assembly on the Clamping Table can be achieved.

Initial testing verified this test procedure criterion but did not complete a CCTV Camera Assessment Form for this coverage. Presumably, CCTV camera 7, which provides good coverage of the lower clamp, was used to verify coverage.

The TAC's criterion required that both cameras provide this coverage. Camera 4, as tested, and camera 8, as specified, did not provide good coverage of the lower clamp. However, camera 3 provided good coverage.

TAC Change Notice 001 revised the criterion to read; "...both cameras (3 and 7) can be positioned to verify the partial extraction of the rods." The intent was that camera 3 would be normally positioned to view the lower clamp and that camera 7 would be normally positioned to view the upper clamp. Camera 3 would provide positive indication of rod movement in respect to other rods. Camera 7 would provide reasonable coverage for rods which may have slipped from the grippers.

Testing as per TPCN #4, Section 8.3, demonstrated that both cameras 3 and 7 provided good coverage for the first rod extraction hold point. Camera 7 could identify when a single rod was not in the gripper. Camera 3 could identify that rods were moved in respect to one another. Either camera could be used to verify partial extraction.

However, the lower end fitting on PWR fuel assemblies may interfere with camera 3's coverage for rods in the bottom rows of some fuel assemblies. In this case, camera 7 would provide adequate coverage alone.

Also, since the first hold point is at 1.164 inches back from the grip rods position which obtained a nominal 1/2 inch insertion, rods initially offset east by more than 0.564 inch would not be seen to be out-of-the-gripper.

Camera 3 then should provide adequate verification.

But, if both cases occur, then camera 9 on the RBT would provide the best view.

However, there was an additional problem with the existing safe position currently programmed for the Manipulator Transporter (MT). Camera 3, as mounted, could not see the lower clamp position for some fuel types (Ref. TPCN #4, ERLs #15 and 19). This was true for W 17x17 and may be true for other fuel types. The MT steel interfered with visual coverage for camera 3. For testing as per TPCN #4, the MT was manually placed at the west hardstop. For the TAN Facility, either the safe position of the MT must be modified or camera 3's mounting must be extended east in Phase IV.

This revised functional criterion has been demonstrated adequately to support the IST.

- o When "CONTINUE" is actuated, pull heads A and B are retracted (east) to the second hold point (176 +/-0.25 inches) and the motors stop.

The hold point's location was previously demonstrated. Testing as per Sections 8.1.2.1 and 8.1.2.2 demonstrated that the second hold point was at 176 inches.

Testing verified that the pull heads were retracted to the second hold point position.

- o When "CALL CAMERA" is actuated at this second hold point, video images from cameras No. 7 and 8 are displayed on the monitors.

Testing demonstrated that the "CALL CAMERA" function at the first hold point produced images from cameras 4 and 7. This represented an error in the TAC and the test procedure. ERL #4 applied.

It was subsequently determined that cameras 4 and 8 did not provide adequate coverage to verify this hold point. Camera 8 was incorrectly located to perform this function. Camera 4 cannot see the east end of the rods at this hold point. Both cameras 3 and 7 could be used to verify that all rods in the rod row have been extracted or to count the number of rods remaining in the row. TAC Change Notice 001 was prepared to revise the

camera numbers to cameras 3 and 7.

TPCN #4, Section 8.3 was prepared to retest for the revised camera selection. Testing as per TPCN #4 demonstrated that cameras 3 and 7 were selected by the camera call at the second rod extraction hold point.

- o Cameras can be positioned to achieve a clear and unobstructed view of pull heads A and B and fuel rod interfaces (grippers) to determine the number of rods extracted.

Testing was performed and obtained the result that cameras 4 and 7 were displayed at this hold point. The TAC required that cameras 4 and 8 be presented at this hold point. The TAC's requirement did not reflect the current design which used cameras 4 and 7 for this hold point. ERL #4 applied to this observation. No CCTV Assessment Form was prepared in initial testing at this hold point.

Camera 8 provided some coverage at this hold point but its current location was inadequate to determine the number of rods extracted. It showed a side view of the extracted rods, which may be useful to see that all rods are extracted. However, the view was inadequate to count the number of rods remaining as was required by the hold point.

Camera 4 did not provide adequate coverage to see if all rods were extracted.

TAC Change Notice 001 revised the camera call to select cameras 3 and 7 and revised this criterion to read; "Both cameras can be positioned to verify the extraction of rods or to count the remaining rods". This is a functional criterion. It was not necessary to see the grippers to verify that all rods were extracted. It was adequate to determine the fact and the quantity of any rods remaining in the rod row of the fuel assembly.

TPCN #4, Section 8.3 demonstrated that cameras 3 and 7 provided adequate coverage to determine if rods were remaining in the rod row and to count the number, if any.

- o When rod counts are input and "CONTINUE" is actuated, all grippers on both pull heads A and B are open.

Testing verified that the pull head grippers opened after the rod count was entered and "CONTINUE" was actuated at the second hold point.

- o Pull heads A and B are retracted (east) to the full retracted position.

Testing verified that the pull heads were retracted to the third hold point's drop rods position.

- o A hold point is generated.

Testing verified that the third hold point was presented to verify that all rods were released.

- o When "CALL CAMERA" is actuated at this third hold point, video images from cameras No. 7 and 8 are displayed on the monitors.

Testing as per Section 8.1.6.1 demonstrated that the "CALL CAMERA" function at the third hold point produced images from cameras 4 and 7. ERL #4 was applicable. The current design called for cameras 7 and 8 to be presented at this hold point.

It was determined that camera 7 did not provide adequate coverage to verify this hold point. Camera 8 was correctly located. Camera 4 can provide partial coverage at this hold point. TAC Change Notice 001 was prepared to revise the camera numbers to cameras 4 and 8.

TPCN #4, Section 8.3 was prepared to retest for the revised camera selection. Testing demonstrated that cameras 4 and 8 were selected by the camera call at the third rod extraction hold point.

- o Cameras can be positioned to achieve a clear unobstructed view of the jaw/fuel rod interfaces to verify that all rods are released.

Because of testing performed, cameras 4 and 7 were displayed at this hold point. The TAC required that cameras 7 and 8 be presented at this hold point. ERL #4 applied to this observation. No CCTV Assessment Form was prepared in initial testing at this hold point.

Investigation indicated that camera 8 provided coverage at this hold point. It showed a side view of the

grippers which verified that all rods were released. Not all of pull head B's grippers were viewable, but it could be determined that there were no full rods in the grippers. A very short piece of broken rod or end caps still in the gripper might not be visible. The current interference was caused by the support for the side transfer's open proximity sensor. This sensor could readily be relocated or the camera could be relocated in a later phase. Coverage was adequate for the IST.

Camera 7 did not provide adequate coverage to determine if all rods were released.

TAC Change Notice 001 revised the camera call to select cameras 4 and 8 and revised this criterion to read; "Camera 8 provides a view of the jaw/fuel interface sufficient to determine that all rods are released."

TPCN #4, Section 8.3 demonstrated that camera 8 provided adequate coverage to determine that all rods were released. The revised functional criterion is demonstrated. Cameras 4 and 9 each provided only partial backup coverage from above, but certain grippers were hidden from both cameras.

- o When "CONTINUE" is actuated, a signal is generated to the Side Transfer System.

Testing verified that the side transfer task call occurred.

Based on the results of these SINGLE and AUTO mode tests, the Rod Extraction equipment was judged to be acceptable for the normal IST.

4.7 VERIFICATION OF ALIGNMENT AND EXTRACTION OPERATIONS FOR NORMAL FUEL ASSEMBLIES AND FOR BOWED FUEL ASSEMBLIES

The purpose of Section 8.1.7.1 was to demonstrate extraction operations for normal assemblies with two rods in each clamping position offset east by 2 inches. Test sequences were performed using 0.375 inch diameter solid carbon steel rods, to simulate W 17x17 fuel rod.

Seventeen test rods simulating W 17x17 fuel were located in each Clamping Table position. Rod positioning was accomplished using wooden blocks with nails set to achieve spacing. Two rods in each set were extended east 2 inches from the others to represent offset

rods. The rod extraction operation was then performed.

The section repeated the demonstration of SINGLE and AUTO mode sequencing criteria already demonstrated above. Some variation in criteria wording is noted, but the intent is taken to be the same as in the previous sequence specific criteria. The section demonstrated the following additional specific criteria:

- o Gripper jaws on pull heads A and B close accommodating a 2.00 inch offset in the rods.

Initial testing was as per Section 8.1.7.1 using a 2 inch offset. It was found that the grippers were able to extract rods with a 2 inch extension from the test array but that the rods with the 2 inch offset were not always properly released after extraction. ERL #5 was prepared. (See also Section 4.7.1.11 below for ERL #5). Subsequent checking documented in the test log indicated that rods offset by 1-1/2 inches could be gripped and released. TAC Change Notice 001 revised the TAC for this criterion.

Testing as per Section 8.1.7.1 also demonstrated that all W 17x17 fuel rods were grasped by the gripper jaws. However, it required two attempts to accomplish this. On the first attempt, four rods were not gripped. No ERL was prepared. It is probable that the cause of this problem was the fact that the rods were loosely supported with no restraint. Subsequent testing with bowed rods identified this as a problem.

Temporary inserts were subsequently placed in the gripper jaws to limit the insertion length to a nominal 2 inches. With the design 0.5 inch normal insertion, a maximum of 1.5 inch offset (extended) could be accommodated. TPCN #4 was prepared to re-demonstrate gripper operations with these inserts and to verify that bottomed-out rods were properly released.

TPCN #4 was also prepared to re-demonstrate operations with bowed and offset rods simultaneously. Rods were positioned using prefabricated alignment blocks (wooden blocks with nails). The upper clamp slide was moved to the east end of travel to obtain greater alignment. Rod alignment with the grippers was not very well obtained in the test setup. The W 17x17 upper grid would have forced better alignment at the east ends of the rods. Some individual rods had to be manually guided into the grippers because they were slightly bent in previous

testing or handling.

TPCN #4 testing failed to demonstrate that a 1-1/2 inch offset was accommodated. ERL #40 was prepared. Offset was limited to about 1-1/4 inch (insertion length was limited to about 1-3/4 inches). One non-offset rod was not accommodated. This single rod observation was assumed to be the result of friction in the pull head. This had been observed in previous testing and was felt to be an artifact of the test methodology. The actual insertion lengths available were not measured.

Part of the problem with this testing as per TPCN #4 was a difference in reference positioning of the ends of the rods. The rod positioning criterion was understood to be; "one inch west of the east end of the Clamping Table." Setup was performed with "east", not "west". TPCN #9 corrects TPCN #4 for this discrepancy. However, setup was performed at "one inch east of the inside lip on the east end of the Clamping Table". TPCN #4 testing was performed from the outside of the lip, a difference of about 1/4 inch. Thus, the test rods were not aligned to match the programmed setpoint. The physical set point used in initial setup was not documented in this test procedure.

The revised criterion was not demonstrated in Phase III testing. Continued testing with these pull heads for rod offset was not warranted. Completed testing was adequate to support the IST.

- o Pull heads A and B were retracted (east) to the full retracted position, releasing all test rods.

Testing as per Section 8.1.7.1 verified that the pull heads were retracted to the third hold point position. Although all rods were to be released at this point, this rod release criterion was not technically specified in the TAC. Not all rods were released in initial testing. ERL #5 was prepared to identify that rods inserted at greater than a 1.5 inch insertion length did not always drop from the grippers.

Temporary inserts were placed in the grippers to limit rod insertion length to 1-1/2 inch so that rod release would be ensured. TPCN #4 was prepared to test these inserts and to demonstrate that rods inserted to the new bottomed-out insertion length would be reliably released.

Testing as per TPCN #4 inserted 34 rods to the bottomed-out position and then demonstrated the extraction cycle. Two of the 17 rods in pull head A did not release from the open grippers. All rods in pull head B were released. When the two remaining rods in pull head A were manually removed, the insertion length was observed to have remained approximately bottomed-out at about 1-1/4 inch. ERL #41 was prepared.

The test rods used in TPCN #4 had been lubricated to retard rusting. This lubrication may have interfered in this testing in that contact friction with the rod supports was required to drag the rods from the grippers. The lubrication may have hindered the rod release at the rod support end, while aiding at the gripper end. Alternatively, the available insertion length may still remain too great for reliable rod release with the current design of the pull heads.

Resolution of this issue was not pursued because the pull heads are expected to be redesigned in a later phase. A pull head design with a pivoting lower jaw may resolve this problem. Testing was adequate to support the IST which does not require the use of offset rods.

- o The operator via the CCTV system was able to verify which rods were released.

This criterion, as worded, was not specified in the TAC. The purpose of the third hold point was to verify that all rods were released. However, for recovery operations, it is important to know which jaw in which pull head must be operated. The knowledge of the specific rod locations for nonreleased rods would be valuable. If the specific jaw cannot be identified, then recovery operations may require the operations of more jaws than are actually required.

CCTV camera 8 did not provide adequate coverage for counting gripper positions to determine which rod was not released. Gripper counting was difficult for those grippers which could be observed. Not all grippers for pull head B could be observed.

With the future redesign of the pull head, the probability of a nonreleased rod is expected to be negligible. Relocation of camera 8 may slightly improve the counting capability. However, it is not clear that

it is worthwhile to be sure about the exact gripper location. In an off-normal procedure used rarely, if ever, efficiency may not be of prime concern.

TPCN #4, Section 8.3 demonstrated that camera 8 provided coverage adequate to determine that all rods were released. Coverage was adequate for the IST.

The purpose of Section 8.1.7.2 was to demonstrate extraction operations for bowed assemblies with two rods in each clamping position offset east by 2 inches and all rods bowed by 1.5 inches.

The test setup was equivalent to that used for Section 8.1.7.1 except that the center of the rods was shimmed up by 1.5 inches to represent a bowed fuel assembly.

The section repeated the demonstration of SINGLE and AUTO mode criteria already demonstrated above. The section demonstrated the following additional specific criteria:

- o Gripper jaws on pull heads A and B close accommodating a 2.00 inch offset in the rods.

Neither the TAC nor the test procedure specifically listed criteria for accommodating rods from fuel assemblies with a 1.5 inch bow. No TAC Change Notice or TPCN was prepared to specifically list this criterion. Testing was prepared to demonstrate that a 1.5 inch fuel-rod bow was accommodated by the grippers. This testing also demonstrated an offset in addition to the bow due to the format used in the TAC. The TAC's criterion is worded so that bowed and offset rods are to be demonstrated.

Testing as per Section 8.7.1.2 was performed with a test array of rods. The initial attempt indicated that the test rods were free to be pushed back because of the minimal friction produced in the initial test setup. Weights were added to simulate the rod restraint of an intact assembly. Retesting of the weighted rods was able to get 33 of 34 rods on the first attempt. The 34th rod was gripped on the first programmed-option retry. The test log entry indicated that the retry with other rods gripped resulted in subsequent release failures due to overinsertion. The second programmed option, which would perform the retry after the current rods are released, would be the better choice.

However, TPCN #4 was prepared to re-demonstrate this criterion using the gripper inserts to demonstrate that all rods were gripped on the first try.

Testing failed to obtain gripper alignment with the rods. The bowed and offset rods had to be manually guided into the grippers. The test methodology did not accurately represent a bowed W 17x17 fuel assembly.

It was decided that it was not worthwhile to repeat this testing under an alternate methodology which more closely represented a bowed fuel assembly. Initial testing had demonstrated that, once properly restrained, all rods could be gripped even though it took a second attempt. The second attempt in initial testing was required because of horizontal surface friction in the jaw. This would not be a problem if the rods were restrained as in a fuel assembly.

Initial testing demonstrated that a bowed and offset rod can be processed.

Based on the results of these tests, the Rod Extraction equipment was judged to be acceptable for the normal IST.

4.8 VERIFICATION OF SERVO-DRIVE FAULT RESPONSES

This test sequence consisted of implementing a servo-drive fault during the operation of pull head drive A M-107A. The purpose of this test was to verify that the equipment properly responded to the fault condition and that the proper signals and error messages were displayed at the Control System. The test was executed by operating the Rod Consolidation System in the SINGLE mode and simulating a torque fault condition in the motor by temporarily changing the Control System data register.

The system performed as designed, meeting acceptance criteria as follows:

- o Motor stops when fault is implemented.

Testing as per Section 8.1.8 demonstrated that the initiation of a torque fault for pull head drive M-107A stopped the motor while operating the SINGLE mode.

- o Alarm system is activated.

Testing as per Section 8.1.8 demonstrated that the

initiation of a torque fault for pull head drive M-107A resulted in an audible alarm.

- Alarm is silenced when acknowledged by the operator.

Testing as per Section 8.1.8 demonstrated that the fault alarm was silenced when "ALARM ACK" was actuated on the control screen.

- Control System displays the fault condition on the control screen.

Testing as per Section 8.1.8 demonstrated that the FAULT condition was displayed on the control screen.

- A report is generated defining the fault condition when commanded by the operator.

TAC Change Notice 001 corrected the alarm report criterion to indicate that the alarm is printed automatically. This was a simple clarification. TPCN #6 updated the test procedure's criterion.

Testing as per Section 8.1.8 demonstrated that the alarm message was printed.

- When "CALL CAMERA" was activated, video images from cameras 4 and 7 were displayed on the monitors.

Testing as per Section 8.1.8 demonstrated that the torque fault camera call resulted in the display of CCTV cameras 4 and 7.

- Both cameras can be positioned to provide an unobstructed view of the overall extraction system and close-up of each drive system over their entire lengths.

Testing as per Section 8.1.8 demonstrated that the torque fault camera call resulted in the display of CCTV cameras 4 and 7. CCTV coverage was signed off as adequate. However, the CCTV Assessment Forms were not prepared at the time of testing. TPCN #4 was prepared to complete the CCTV Assessment Form with manual camera selection.

TPCN #4, Step 8.8.3, testing completed the CCTV Assessment Form for cameras 4 and 7. Camera 4 provided an unobstructed overall view of the Rod Extraction System from above but did not have a good perspective on the

Cable Management System. It had good coverage of the drive components. However, portions of the drive gear were hidden by structural members. If the pull head were located under the structural members, then visual coverage for the pull head would be limited.

CCTV camera 7 provided a partially obstructed view of the overall extraction system. The NFBC Loader obstructed coverage of the north side. However, camera 7 provided good coverage of the Cable Management System.

The camera selection was the best available. Cameras 3, 9, 10, and 8 could provide additional coverage if the initial camera selection was not adequate.

The criterion, as worded, required far too much. More cameras would be required to meet the letter of the "close up of each drive system over their entire length" requirement. Camera selection and coverage were adequate for the IST.

- o The system can be recovered from a fault condition and SINGLE mode operations continued.

Testing as per Section 8.1.8 demonstrated that SINGLE mode operations could be continued following recovery from the alarm condition.

Therefore, the Rod Extraction System was judged to be acceptable for continuing on to the next series of tests.

4.9 TPCN #4, PULLING FORCE LOAD CELL INDICATIONS

TPCN #4, Section 8.5 addressed a TAC which was not included in the original test procedure. It sought to demonstrate that the difference between the test load cell indication and the indicated pulling force was constant.

Testing as per TPCN #4 demonstrated that pulling forces could not be accurately measured over all operating conditions. The number of grippers closed and the sequence in which they close had an impact. The four jaws in each pull head interacted so that a separate calibration curve would be required for each operating condition.

This criterion was not demonstrated in Phase III. It was carried as an open item for a later phase. The pull heads can be redesigned in Phase IV to eliminate the interaction between jaws.

This failure will have an impact upon the IST but not in the performance of testing. An IST criterion requires that the pulling force report accurately reflect test conditions. The pulling force report's accuracy will not be demonstrably accurate. However, this does not affect the validity of other IST requirements, and was acceptable for this phase.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

In general, the Rod Extraction System performed adequately as designed with minor modifications. The system performed its function to grip the rods, to extract the rods to the first hold point for verification of partial extraction, to extract the rods to the second hold point position to verify that all rods were extracted, and to release the rods at the third hold point position. The following conclusions are drawn from this SOT.

- o With minor exceptions, the drive systems operated as designed under both loaded and unloaded conditions.
- o With minor exceptions, the system operated as designed for all modes (JOG, HAND, SINGLE, and AUTO) of operations.
- o The system operated as designed under fault conditions.
- o The proper pull head drive interface with the clamping table was achieved.

Based on these conclusions, the Rod Extraction System has been judged acceptable for the normal IST.

5.2 RECOMMENDATIONS

As a result of the SOT performed, several recommendations have been made. These recommendations, along with those identified in Section 7.0 of the main body of this report, should be implemented for the next generation system. These recommendations are as follows:

- o Evaluate the pull-head-extend gripper-open interlocks. The current interlock inhibits operation of only one pull head if a gripper is not open. The other pull head drive can operate, and this may interfere with automatic sequence operations. If one pull head is interlocked, then the other should not be allowed to extend to grip

rods. Both should operate or stop at the same time.

- o Redesign the pull head proximity sensors so that full motor speed may be used in the JOG mode. With this redesign, then a runaway motor in programmed mode operations would be interlocked electrically from contacting hardstops. This may require an increase in pull head drive available travel and the relocation of hardstops. An alternative may be to provide motor brakes for the pull head drives.
- o Redesign the pull head grippers so that the intended 160 to 200 lbs pulling force may be attained for all grippers for all rod counts in the grippers and for insertion lengths of 0.5 to 2.0 inches.

The Phase II design of the grippers allowed for a very short rod drop. In Phase III, the grippers were redesigned to partially address a deformation problem under load. This redesign raised the grippers sufficiently to allow for a better gripper design. The increased rod drop is acceptable. No bounce was observed which would change rod sequence or cause overlap of the rods. A design is possible which would eliminate the pulling force "tare weight" loading from gripper closure and allow for better rod management.

The implementation of this new design would provide a nominal 0.75 inch gripping surface only. The current implementation provides a gripping surface proportional to the rod insertion length.

The implementation of this new design would eliminate the insertion length problem currently addressed with temporary inserts. The current design uses a pivoting upper jaw to release the rods which then must be drug out from the jaw. Rods would more readily drop from a pivoting lower jaw.

- o Evaluate the "CALL CAMERA" feature programmed for hold points. A hold point is also an alarm condition to the Process Control System. At a hold point, both the hold point's and the alarm condition's "CALL CAMERA" features are enabled. If the alarm's "CALL CAMERA" is actuated, then the wrong cameras may be displayed. Perhaps a single "CALL CAMERA" feature on the control screen is a better solution.

- Evaluate the addition of protective covers at the east end of the Clamping Table. Currently, depending upon upper grid position, the extracted rods may drop on the electrical components located at the far east end of the table.
- Evaluate the rod drop distance after extraction in respect to irradiated fuel. Currently, extracted rods drop a few inches to the Extraction Table's rod support surface. There is some impact as the rods land on the table's surface. Reevaluate this interface.
- Evaluate using a continuous flat surface for the removal of rods from the grippers. Recovery from a stuck rod in a gripper would involve a switching to JOG mode, a positioning of the rod further west to provide room, and a rapid move east for the pull head. The acceleration in such a move should overcome the friction of the rod in the gripper and allow the rod to be pulled free.

A wide flat support could assist in recovery operations for a rod which had not been released from the gripper. Depending upon rod length, the current design may allow a rod to drop down below the top of a support bar. This would limit the ability to push the nonreleased rod to the west and may cause rod damage.

Full speed JOG mode operations would be required for recovery operations since the acceleration ramp in programmed operating modes may not allow sufficient acceleration to jerk a stuck rod from the gripper.

- Evaluate using a flat surface for the support of dropped rods. This flat surface may require cutouts and lips for side transfer operations but would make the recovery of any dropped fuel pellets easier. Pellets would be more readily located and the RM-10A, with a tool, may be able to reach into the area to retrieve a dropped pellet or a broken rod as indicated in the Phase II Final Report.
- Reevaluate the pulling force data acquisition system. With properly designed grippers, pulling forces cannot exceed a design value. The design value of ≤ 200 lbs. is much less than the calculated 1000 lbs. necessary to break a degraded rod. For normal operations, there is little need to obtain and record pulling forces. No interlocks or alarms are provided, nor are they required. The history of pulling forces may provide an indicator of

gripper fatigue or failure, but the necessity of this is not clear. Pull head assemblies are expected to be replaced on a maintenance schedule before failure.

There is one situation in which pulling forces may be of operational interest, and this would be in the pulling of a stuck rod. If the gripper in use could exceed the design-limited force value, then an indication of the actual value could be used to limit the applied force. The force would be limited to a value less than a specific give-it-up value. If the stuck rod could be pulled below this administrative limit, then off-normal operations would be simpler. If not, then the assembly would have to be processed at the Off-Normal Station. This application would only require a current-value force indication.

- o Reevaluate camera coverage for the rods-released hold point. If dual camera coverage is required for each hold point, then an additional camera would be required for this hold point. Camera 8 is adequate as long as it is functional. There is not an available backup should camera 8 fail.
- o Reevaluate the location of CCTV camera 7. A location nearer the Clamping Table's upper clamp would provide a better view for rods which may not be partially extracted at the first hold point.
- o Reevaluate the location of CCTV camera 3 in respect to the MT's safe position. If the camera were mounted further east, the interference may not occur. This would also tend to provide better coverage past the lower end fitting for PWR assemblies.
- o Reevaluate the acquisition and presentation of torque information. These data are not useful and the display should be deleted.
- o Re-evaluate the acquisition and presentation of speed information for the pull head drives M-107A and M-107B. These data, except for the Upper and Lower Cutting System's cutting tools, are not useful and the display should be deleted.
- o Phase IV testing should include testing of the pulling force acceptance criteria which were not adequately demonstrated in Phase III. Due to design problems, the

accuracy of pulling force data could not be demonstrated in Phase III. Phase IV testing should closely evaluate gripper pulling force repeatability using mechanical methods for all anticipated operating conditions including operating mode, variations in insertion length, and jaw operating sequence.

- o Phase IV testing should demonstrate whole batch operations with reconstitutible mock-up fuel assemblies to demonstrate system interactions from start to finish.
- o Phase IV testing should demonstrate automatic mode operations with a single fuel assembly on the Clamping Table.
- o Phase IV testing should demonstrate normal operations with other fuel types, off-normal operations, and maintenance operations.
- o Phase IV testing should demonstrate continued automatic mode operations following recovery from defined off-normal events and applicable maintenance operations.

ATTACHMENT 1
SYSTEM OPERATIONAL TEST PROCEDURE
FOR
FUEL ROD EXTRACTION SYSTEM
(WBS 1.3.2.2)
DOCUMENT NO. 9315-TP-201

Signature

Peter V. Jallo Date 4/23/92

TEST PROCEDURE

CLIENT: DOE/Rod Consolidation

PROCEDURE NO.: 9315-TP-201

LOCATION: Cold Test Facility

REVISION NO.: 0

TITLE: System Operational Test Procedure

RELEASED FOR:

☐

REVIEW

☒

TEST

SYSTEM OPERATIONAL TEST PROCEDURE
FOR
FUEL ROD EXTRACTION SYSTEM
(WBS 1.3.2.2)

APPROVED

Frank Y. Jallo

DATE

11/13/91

PROJECT MANAGER

APPROVED

Professor

DATE

11/13/91

QUALITY ASSURANCE

APPROVED

Roman Michailiw

DATE

11/13/91

DISCIPLINE MANAGER

APPROVED

Frank Y. Jallo

DATE

11/11/91

AUTHOR

REV	PREPARED	DATE	APPROVED	DATE	APPROVED	DATE	APPROVED	DATE	APPROVED	DATE

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

TEST PROCEDURE 9315-TP-201

REVISION 0

PAGE 1 of 11

REVISION CONTROL SHEET

Revised Page No.

Latest Revision

Date

Original

0

November 13, 1991

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1.0 OBJECTIVES OF TEST

The objective of this test procedure is to demonstrate the fuel rod extraction system meets the design requirements. The specific goals for this test procedure are:

- Verify carriage "A" and "B" operations
- Verify pull head operation
- Verify pull head/clamping table interfaces
- Verify pull forces.

2.0 PREREQUISITES

2.1 System set-up has been performed per the instruction of Appendix A.

Test Conductor EB Farnest Date 6/30/92
QA W. J. [Signature] Date 6/30/92

2.2 Camera, film, lighting and personnel are available to take photographs per the instruction of Appendix C and the detailed procedure steps (Section 8.0).

Test Conductor EB Farnest Date 6/30/92
QA W. J. [Signature] Date 6/30/92

2.3 The QA/QC Data Package has been prepared in accordance with Specification 9315-M-200, and the applicable Bill of Material, and is acceptable.

Test Conductor EB Farnest Date 6/30/92
QA W. J. [Signature] Date 6/30/92

2.4 The system has been assembled in accordance with all applicable Drawings, DCNs and FCRs.

Test Conductor EB Farnest Date 6/30/92
QA W. J. [Signature] Date 6/30/92

- 2.5 The Test Conductor has been qualified and certified in accordance with QAP 2.0.

Test Conductor EB Forest Date 6/30/92
QA W. J. Mulgrew Date 6/30/92

- 2.6 All test personnel participating in this test have been trained per the instructions of Section 6.4 of Reference 11.1.

Test Conductor EB Forest Date 6/30/92
QA W. J. Mulgrew Date 6/30/92

- 2.7 The checklist contained in the Control System SOT (9315-TP-601) applicable to this system must be completed and the results accepted prior to the initiation of testing under this procedure.

Test Conductor EB Forest Date 6/30/92
QA W. J. Mulgrew Date 6/30/92

- 2.8 A limited access area with warning signs has been established around the equipment being tested.

Test Conductor EB Forest Date 6/30/92
QA W. J. Mulgrew Date 6/30/92

- 2.9 The system FAT has been completed and accepted by MUS.

Test Conductor EB Forest Date 6/30/92
QA W. J. Mulgrew Date 6/30/92

- 2.10 All equipment required to support this test as defined in Section 6.0 of this procedure is operational and calibrated as required.

Test Conductor EB Forest Date 6/30/92
QA W. J. Mulgrew Date 6/30/92

2.10
W. J. Mulgrew
6/30/92

- 2.11 A visual inspection of the system being tested has been performed to verify there are no obstructions and/or damage to the equipment that may impact testing.

Test Conductor EB Farnest Date 6/30/92
QA LA Hufnagel Date 6/30/92

- 2.12 The environmental conditions as defined in Section 4.0 are met.

Test Conductor EB Farnest Date 6/30/92
QA LA Hufnagel Date 6/30/92

- 2.13 Procedures for changeover of fuel types for the Control System are in place in the Control Room.

Test Conductor EB Farnest Date 6/30/92
QA LA Hufnagel Date 6/30/92

- 2.14 Clamping table has been installed and is operational.

Test Conductor EB Farnest Date 6/30/92
QA LA Hufnagel Date 6/30/92

- 2.15 As a minimum, cameras 4, 7, and 8 are installed and operational.

RL #1
40P 6/30/92

Test Conductor EB Farnest Date 6/30/92
QA LA Hufnagel Date 6/30/92

3.0 INITIAL TEST CONDITIONS

- 3.1 TV monitors are "ON".

Test Conductor EB Farnest Date 6/30/92

- 3.2 W 17 x 17 Pull Heads are mounted on Carriages 'A' and 'B'.

Test Conductor EB Farnest Date 6/30/92

- 3.3 Software for processing W 17 x 17 is loaded in Control System.

Test Conductor EB Farnest Date 6/30/92

4.0 ENVIRONMENTAL CONDITIONS

At least One HVAC unit for the control room and the air circulation system for the Test Cell should be operating and maintaining the test cell and control room temperatures in the ranges 60° to 90° and 65° to 85° respectively.

Test Conductor

SVB Farnest

Date

6/30/92

5.0 SPECIAL PRECAUTIONS

- 5.1 All precautions, warnings and notes are addressed in the Detail Test Steps (Section 8.0), prior to the step to which they apply.
- 5.2 Care must be taken to ensure that the rod extraction system and adjacent equipment (if installed) do not collide while performing test operations.
- 5.3 Safety glasses shall be worn during all machining operations.

6.0 SPECIAL EQUIPMENT REQUIRED

6.1 Calipers or measuring devices as follows:

- Tape measure, 0 to 200 inches with 1/32 inch increments.
- Caliper, 0-12 inch range.

6.2 Stopwatch

~~6.3 Torque measuring device, minimum range 0-12 lb ft.~~

6.4 Load cell test fixture (DWG 9315-M-0012, GRP3).

6.5 Dial Indicator

^{initial}
C
TPN #2
SMF 6/30/92

TPCWS
6/19/92

7.0 TEST DATA RECORDING

7.1 Test Data Records

The test conductor shall designate one copy of the test procedure and its attachments as the "Record Copy" and shall ensure that this copy is maintained current. All test data, significant events, and observations must be recorded in this document. Additional sheets may be used as necessary, but must be permanently affixed to this report by staples and/or tape.

7.2 Test Procedure Modification

This section addresses the process for making modifications to the approved Test Procedure. These modifications will fall into one of three categories, as follows:

- Corrections are modifications to the procedure due to typos or incorrect information.
- Minor Changes are modifications which do not affect functional intent or acceptance criteria of the test.
- Major Changes are changes that affect functional intent or acceptance criteria.

Each of these modifications will be handled differently. If a correction is required to the procedure, it will be made with pen and ink in the "Record Copy", as they are found. The test conductor will make the appropriate change. Once the change is made, he will initial and date the change for future reference. All modifications which are considered minor changes must be documented on "Temporary Procedure Change Notice" (TPCN) forms (refer to Appendix D). This change shall be approved by the test conductor by annotating that the test procedures are using the TPCN form. All modifications which are considered a major change must also be documented on the TPCN form. However, when a major change is required, testing shall be halted until the TPCN is approved by the responsible Test Engineer, Test Conductor, Quality Assurance and Project Engineer.

7.3 Repairs/Retesting

This section addresses the process for making necessary repairs to the equipment and retesting of the system. If during testing a problem is observed which requires repair or rework of the equipment, testing shall be halted. If the repair/rework is minor, the Test Conductor will document the problem, cause, and corrective action implemented, the faulty system will be retested. All remaining tests will continue on until conclusion. If the problem requires redesign of the faulty system, all testing of this equipment will be halted. The problem and recommended solution will be documented and submitted to the Test Review Group (TRG) for approval. Once approval and the repair is complete, testing of the equipment will be accomplished in accordance with this procedure.

8.0 DETAILED TEST STEPS

The following sequences of tests are arranged per fuel type. All tests pertaining to a certain fuel are performed, then repeated for the next consecutive fuel type. The order in which these tests are performed will not have an impact on the results and can therefore be performed in any order as deemed appropriate by the test conductor.

8.1 System Verification for the W 17 x 17 Fuel Type

The following series of tests are performed to verify the operability of the fuel rod extraction system specific to the W 17 x 17 fuel type. Prior to initiating testing, verify that the Control System is programmed for the W 17 x 17 fuel type.

Test Conductor

Eric Forest

Date

6/30/92

8.1.1 End of travel sensor verification tests.

8.1.1.1 Verify the operation of the end of travel sensors (proximity switches) for Pull Head Carriage 'A' as follows:

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

WARNING

All personnel should remain clear of carriage while in operation.

CAUTION

Care must be exercised while operating the drive systems in 'JOG' mode of operation.

1. Place Carriage Drive System 'A' in 'JOG' mode at 50% speed by calling up control screen for the rod extraction system and pressing 'JOG' and 50% speed on screen.

7. All Test Steps 1 thru 6 have been performed

Test Conductor EB Farnett Date 6/30/92

8.1.1.2 Verify the operation of the end of travel sensors (proximity switches) for Pull Head Carriage 'B' as follows:

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

WARNING

All personnel should remain clear of carriage while in operation.

CAUTION

Care must be exercised while operating the drive systems in 'JOG' mode of operation.

1. Repeat Test Steps 1 thru 6 of Section 8.1.1.1 above for Pull Head Carriage 'B'.

Acceptance Criteria

- Control System indicates end of travel limit switch has been activated each time the carriage trips the switch.
- Carriage does not engage hard stop in either direction of travel.

Test Conductor EB Farnett Date 6/30/92

QA 4/11/92 Date 6/30/92

2. All test steps for Pull Head Carriage 'B' as defined in Step 1 have been completed

Test Conductor EB Farnett Date 6/30/92

8.1.2 Drive System (M-107A) and (M-107B) Operation Verification Tests.

8.1.2.1 Verify the operation of the Pull Head Carriage Drive System (M-107A) as follows:

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

WARNING

All personnel should remain clear of carriage while in operation.

1. Place Carriage Drive System (M-107A) in the 'HAND' mode of operation on the control console.
2. Drive the carriage to its full extended position (West) if not already in position.
3. Select a reference point from which the distance the carriage travels can be measured. Measure and record the distance from the carriage to this reference point.

Type of Measuring Device N/A Range _____
Identification No. _____ Calibration Due Date _____

Reference Distance 0"

Test Conductor E. Stewart Date 6/30/01

QA [Signature] Date 6/30/02

4. Reverse the motor direction and drive the Carriage 'A' in the retract direction until it automatically shuts off. Measure and record the distance the carriage traveled, from the reference point defined in Step 3 above.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

Type of Measuring Device TAPE Range 2 ft
Identification No. 116 Calibration Due Date 1/16

Travel Distance of Carriage 1'16
(First 'Hold Point')

Acceptance Criteria

- The difference between this measurement and the measurement taken in Step 3 above is ~~5.0 ± .25~~ inches.

Test Conductor 20 Forest Date 6/30/92

QA W. H. H. H. H. Date 6/23/92

- Press 'CONTINUE' on the control console and measure and record the total distance the carriage traveled once it automatically shuts off, motor torque and speed or time of travel.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

Type of Measuring Device	<u>TAPE</u>	Range	<u>N/A</u>
Identification No.	<u>N/A</u>	Calibration Due Date	<u>N/A</u>

Travel Distance of Carriage 176 1/8

Drive Motor Torque TPN # 2 400 6/30/92

Carriage Speed (or time of travel) 3 min ~ 58 in/min
(3.00)

Acceptance Criteria

- The difference between this measurement and the measurement taken in Step 3 above is 176.0 ± .25 inches.

~~Drive Motor torque is ≤ 10.5 lb-ft.~~ TPN # 2 400 6/30/92

- Maximum Speed is 120 to 130 inches per minute.

Test Conductor 20 Forest Date 6/30/92

QA W. H. H. H. H. Date 6/23/92

175.58
3

6. Enter fictitious number of rods pulled into accountability system and press 'CONTINUE' on control console. Measure and record the total distance the carriage traveled.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

Type of Measuring Device Tape Range N/A
Identification No. N/A Calibration Due Date N/A

180 $\frac{1}{8}$

Acceptance Criteria

- The difference between this measurement and the measurement taken in Step 3 above is $180.0 \pm .25$ inches.

Erz Fone, J

Date _____

6/30/92

QA

H. H. H. H. H.

Date _____

6/30/92

7. Repeat Steps 2 thru 6 two additional times.

NOTE

Photographs do not need to be taken of the test setup when repeating the above steps

Type of Measuring Device TAPE Range N/A
Identification No. N/A Calibration Due Date N/A

ist

2nd

Travel Distance of Carriage

First Hold Point

 $\frac{1}{8}$ $1\frac{1}{8}$

Second Hold Point

176 $\frac{1}{8}$

176'8"

Full Retraction

180'8

180

~~Drive Motor Torque~~

Carriage Speed
(or time of travel)

3.00 m

301 me

TPN #2
2MF
6/30/42

9.14

Acceptance Criteria

- TPN #3 6/30/92*
- The difference between the measurement taken at first 'Hold Point' (Step 4) and Reference Distance (Step 3) is $6.0 \pm .25$ inches. *1.0*
 - The difference between the measurement taken at second 'Hold Point' (Step 5) and Reference Distance is $176.0 \pm .25$ inches.
 - The difference between the measurement taken at Fully Retracted Position (Step 6) and Reference Distance (Step 3) is $180.0 \pm .25$ inches.

~~Drive motor torque is ≤ 10.5 lb ft.~~

- RL #12 6/30/92*
- Maximum speed is 120 to 130 inches per minute.

Test Conductor

E.B. Forest

Date

6/30/92

QA

L. Villalobos

Date

6/30/92

8. All Test Steps 1 thru 7 above have been completed.

Test Conductor

E.B. Forest

Date

6/30/92

8.1.2.2 Verify the operation of the Pull Head Carriage Drive System (M-107B) as follows:

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

WARNING

All personnel should remain clear of carriage while in operation.

1. Repeat Test Steps 1 thru 7 in Section 8.1.2.1 above for Pull Head Carriage Drive System (M-107B).

Type of Measuring Device

TAPE

Range

N/A

Identification No.

N/A

Calibration Due Date

N/A

	Sequence No. 1	Sequence No. 2	Sequence No. 3
Travel Distance of Carriage 'B'	0	0	0
First 'Hold Point'	1 1/8	1 1/8	1 1/8
2nd 'Hold Point'	176 7/8	176 7/8	176 7/8
Fully Retracted	180 3/4	180 3/4	180 3/4
Drive Motor Torque	TRN #2 256	256	256
Carriage Speed (or time of Travel)	300	300	300

Acceptance Criteria

- The difference between the measurement taken at first 'Hold Point' (Step 4) and Reference Measurement (Step 3) is 6.0 ± 1.0 inches for each test sequence.
 TRN #3 6/30/92
- The difference between the measurement taken at second 'Hold Point' (Step 5) and Reference Measurement (Step 3) is $176.0 \pm .25$ inch for each test sequence.
- The difference between the measurement taken at Fully Retracted Position (Step 6) and Reference measurement is $180.0 \pm .25$ inches for each test sequence.

Drive torque is ≤ 10.5 lb-ft for each test sequence.
 TRN #2 6/30/92

- Maximum speed is 120 to 130 inches per minute for each test sequence.

Test Conductor E. J. Farnest Date 6/30/92
QA W. M. Farnest Date 6/30/92

- All test step for Pull Head Carriage 'B' have been completed as defined in Step 1.

Test Conductor E. J. Farnest Date 6/30/92

8.1.3 Verify Carriage Drive System operation under worst case load condition as follows:

NOTE

This test represents worst case loading of the Carriage Drive System. Therefore this test does not need to be repeated for the other fuel types.

- Place Pull Head Carriage 'A' in "JOG" mode at 50% full speed and position it a minimum of 18 inches from full extended position (EAST).

2. Set up the load cell test fixture (DWG 9315-M-0012, GRPs) on the clamping table and attach the tension cable to Pull Head Carriage Drive 'A'.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

CAUTION

Both the clamping table and rod extraction system should be carefully observed during this test so that the system can be shut down immediately if a problem exists.

WARNING

When measuring the deflection of the carriage drive rails the load on the carriage should be continuously monitored and if it changes after it has stabilized all personnel must be cleared of the rod extraction system immediately.

CAUTION :

Do not exceed a pull force of 4200 lbs.

3. Start system and drive carriage in retracted (East) direction until the pull force (measured by the load cell test fixture) registers a force of 3400 to 3600 lbs. Record actual pull force and motor torque. Measure deflection between the rails and in the vertical direction and record below. Once measured drive carriage east until tension in cable is relieved. Stop drive system and disconnect load cell fixture from Carriage. Visually inspect pull head carriage and rails.

TPCW
#2
6/13/92
6/13/92

Pull Force

3400

Torque

TPCW #2 6/13/92

Deflection Between Rails

0.003

Vertical 0.00

21.48
9/15/92
TDCNS
VIC
8/16/92

Type of Measuring Device: Dial Indicator

Range: 0 to 0.185 in

Identification No. N/A

Calibration Due Date: 7/16/92

Acceptance Criteria

- Pull force is > 3400 lbs.

~~• Motor torque is ≤ 10.5 lb ft.~~ ^{C#112} ~~TPN #2~~ ~~4/20/92~~

- Rail deflection is ≤ 0.06 inches in both directions.

- There is no visible signs of damage to either the carriage or rails.

Test Conductor E. J. Forest Date 2/9/92

QA A. J. Huelga Date 2/9/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

4. Repeat Steps 1 thru 3 above for Pull Head Carriage 'B'.

Pull Force > 3400
Torque ^{C#112} ~~TPN #2~~ ~~4/20/92~~
Deflection Between Rails 0.00 Vertical 0.00

Acceptance Criteria

- Pull force is > 3400 lbs.

~~• Motor torque is ≤ 10.5 lb ft.~~ ^{C#112} ~~TPN #2~~ ~~4/20/92~~

- Rail deflection is ≤ 0.06 inches in both directions.

Test Conductor E. J. Forest Date 2/9/92

QA A. J. Huelga Date 2/9/92

5. All Test Steps 1 thru 4 have been completed.

Test Conductor E. J. Forest Date 2/9/92

8.1.4 Verification of Gripper Performance

- 8.1.4.1 Verify the pull force of the grippers for the pull heads as follows:

1. Place the Carriage Drive (M-107A) in 'HAND' mode of operation and position the carriage in the full extended (West) direction until it automatically shuts off.

2. Mount two W 17 x 17 pull head onto the carriages by sliding the 'T' bars (DWG 9315-M-2201, Item 45) into the 'T' slots in the carriage (DWG 9315-M-2206, Item 1) until pull head is fully inserted.

NOTE

Verify electrical connector (DWG 9315-M-2201, Item 59) is connected to its mating half in the carriage frame.

3. Tighten captive bolt (DWG 9315-M-2201, Item 44) to a torque of between 18.00-20.00 lb-ft to secure pull head.
4. Place carriage drive in 'JOG' mode of operation at 50% full speed and place pull head in 'JOG' mode of operation.
5. Open grippers and position the test rods (DWG 9315-M-0012, Item 8) into each gripper except for the last gripper on the ~~right~~ side of the pull head when facing it.
6. Position test rod (DWG 9315-M-0012, Item 5) into the last gripper and connected it to the load cell test fixture.
7. Drive all gripper to the closed position until the motor automatically shuts off.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

NOTE

Shut off power to carriage drive motor immediately if the force on the load cell test fixture exceeds 200 lbs.

8. Drive pull head in retract direction (East) and monitor pull force. Record maximum pull force achieved.

NOTE

Test rod should slip free of gripper before reaching pull forces greater than 200 lbs.

Type of Measuring Device Force Gauge Range 0 - 2000 lbs
Identification No. 5-41 Calibration Due Date 10/16/13

Maximum pull force 105 105

Acceptance Criteria

- Pull force was greater than 100 lbs. but did not exceed 200 lbs.

Test Conductor

Sam Fink

Date

7/1/92

QA

A. M. [Signature]

Date

7/1/92

9. Drive pull head to its full extended position.

NOTE

System is in 'JOG' mode so care must be taken not to overdrive the system and trip the end of travel limit switch. The carriage frame should be marked to easily distinguish when pull head carriage is in position.

10. Drive grippers to open position.

11. Move test rod (DWG 9315-M-0012, Item 5) into next gripper to the ^{TEN 45} left and move test rod (DWG 9315-M-0012, Item 8) to gripper on ^{26/47} right.

12. Repeat Test Steps 7 thru 12 above until all 17 grippers has been tested.

Type of Measuring Device Force Gauge Range 0 - 200

Identification No. S-11 Calibration Due Date 10/16/92

NOTE

Do not take photographs of every gripper. Take photographs of initial setup and setup of the center gripper (9th gripper) as a minimum.

Pull Force

Gripper	Sequence No. 1	Sequence No. 2
RL #2 SMF	200 lbs	105 SMF
2	160	100
3	155	110
4	125	100
5	140	195
6	Retest 200 lbs 160	150
RL #2 SMF 8/1/92	155	170
7	155	110
8	145	110
9	180	165
10	130	160
11	185	165
12	180	150
13	170	190
14	160	165
15	165	180
16	182	175
17		

TPCNS (Typical) use 8/1/92

Acceptance Criteria

- Pull force for each gripper was greater than 100 lbs but did not exceed 200 lbs. each time tested.

Test Conductor

E. H. Farnsworth

Date

7/1/92

QA

W. J. H. H. H. H.

Date

7/1/92

13. Drive pull head to its full extended position and repeat Test Steps 6 thru 13 above.

NOTE

It is not necessary to take photographs of the setup of the test for the repeat testing.

Type of Measuring Device Force Gauge Range 0 - 200

Identification No. S - 41 Calibration Due Date 11/16/92

Acceptance Criteria

- Pull force for each gripper was greater than 100 lbs but did not exceed 200 lbs.

Test Conductor

Eric Forest

Date

7/1/92

QA

W. J. [Signature]

Date

7/1/92

14. Repeat Test Steps 1 thru 14 above for the second pull head attached to Carriage Drive (M-107B) 'B'.

Pull Force

Gripper	Sequence No. 1	Sequence No. 2
1	174	174
2	190	128
3	180	190
4	160	130
5	125	165
6	150	180
7	105	170
8	130	140
9	110	180
10	130	140
11	140	115
12	120	155
13	155	150
14	118	135
15	160	110
16	140	120
17	190	120

↑ TP-2015-9315-92

Type of Measuring Device

Force Grip

Range

0 - 200

Identification No.

5-41

Calibration Due Date

10/1/92

Acceptance Criteria

- Pull force was greater than 100 lbs. for each gripper but did not exceed 200 lbs.

Test Conductor E. B. Forest Date 7/1/92

QA M. J. Miller Date 7/1/92

15. All Test Steps 1 thru 15 above were completed.

Test Conductor E. B. Forest Date 7/1/92

8.1.4.2 Verify the pull force of the individual grippers as follows:

1. Drive Pull Head 'A' to its full extended (West) position. Position Pull Head 'B' back (East) approximately 18-24 inches to avoid interference while testing Pull Head 'A'.
2. Position Test Rod (DWG 9315-M-0012, Item 5) into the last gripper on the ~~right~~ side of the pull head when facing it and connect it to the load cell test fixture.
3. Drive the grippers to the closed position until the motor automatically shuts off.

Left Test Rod
East
7/1/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

NOTE

Shut off power to carriage drive motor if pull force exceeds 200 lbs.

4. Drive pull head in retract direction (East) and monitor pull force. Record maximum pull force achieved.

NOTE

Test rod should slip free of gripper before reaching a pull force in excess of 200 lbs.

Type of Measuring Device Force Gauge Range 0 - 200 Lbs.
Identification No. S-41 Calibration Due Date 10/16/92

GRIPPER #1 Maximum pull force 140 145 RL #3

Acceptance Criteria

- Pull force was between 160-200 lbs.

Test Conductor EVS Forrest Date 7/1/92

QA 1/11/92 Date 2/1/92

5. Drive pull head to its full extended position.
6. Drive grippers to open position.
7. MOVE test rod (DWG 9315-M-0012, Item 5) into next gripper to the left of the gripper just tested.
8. Repeat Test Steps 3 thru 7 above until all 17 grippers has been tested.

40F
7/1/92
TIPS
right
OK

NOTE

It is not necessary to take photographs of the setup for every gripper. Photographs should be taken of the setup for the first gripper and the center gripper (9th gripper) as a minimum.

Type of Measuring Device Force Gauge Range 0 - 200 lbs

Identification No. 5-41 Calibration Due Date 10/16/92

Pull Force

Gripper	Sequence No. 1	Sequence No. 2
2	180	160
3	178	160
4	155	195
5	175	190
6	172	165
7	155	168
8	155	160
9	174	175
10	172	175
11	154	160
12	165	190
13	160	160
14	180	184
15	165	165
16	165	162
17	170	160

RL #3
40F
7/2/92

Acceptance Criteria

- Pull force was between 160-200 lbs. for each gripper.

Test Conductor E. J. Farnest Date 7/2/92

QA 1. 11/2/92 Date 7/2/92

9. Drive Pull Head 'A' to its full extended position and repeat Test Steps 2 thru 8 above.

NOTE

It is not necessary to take photographs of the setup for repeat tests.

Acceptance Criteria

- 2143
JTC
01/6/92
- Pull force was between 160-200 lbs. for each gripper.

Test Conductor E. J. Farnest Date 7/2/92

QA 1. 11/2/92 Date 7/2/92

10. Repeat Test Steps 1 thru 9 above for the 'B' pull head attached to carriage drive (M-1078) frame.

Type of Measuring Device Force Gauge Range 0 - 100 lbs

Identification No. 5-41 Calibration Due Date 10/1/92

Conditions

- A. All pull head gripper jaws are open
- B. Side transfer is safe (fully retracted in northern most position)

NOTE

Zero (0) signifies condition not applied.
One (1) signifies condition applied.

TRANS
W
H. H. 2 M107 A

Test	A	B	System Operates			Expected Result
i	0	0	—	yes	✓	no
ii	1	0	—	yes	✓	no
iii	0	1	—	yes	✓	no
iv	1	1	✓	yes	—	yes

Acceptance Criteria

- System does not operate unless the both conditions A and B are applied.

Test Conductor Em Ford Date 7/6/92
QA 12/16/92 Date 7/6/92

- 3. The above Steps 1 and 2 have been completed.

Test Conductor Em Ford Date 7/6/92

8.1.5.2 Verify the Extraction Drive System (M-107B) extend (West) interlock as follows:

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

1. Place system in 'HAND' mode of operation and drive the carriage to its full retracted (EAST) position.
2. Impose the following combination of conditions on the system and attempt to drive the carriage in the extend (West) direction to grip the fuel rods.

Conditions

- A. All pull head gripper jaws are open
- B. Side transfer is safe (fully retracted in northern most position)

NOTE

Zero (0) signifies condition not applied.
One (1) signifies condition applied.

TPN#3
M 107 B

Test	A	B	System Operates		Expected Result
i	0	0	—	yes	no
ii	1	0	—	yes	no
iii	0	1	—	yes	no
iv	1	1	✓	yes	no

Acceptance Criteria

- System does not operate unless the both conditions A and B are applied.

Test Conductor E. B. Farnest Date 7/6/92

QA L. K. Sullivan Date 7/6/92

- The above Steps 1 and 2 have been completed.

Test Conductor E. B. Farnest Date 7/6/92

8.1.6 Verify the Rod Extraction System 'Single' and 'Auto' modes of operations.

8.1.6.1 Verify Fuel Rod Extraction System (Carriage 'A' and 'B') 'Single' mode of operation as follows:

- Place both drive systems (M-107A and M-107B) in 'HAND' mode of operation.
- Drive both systems to their fully retracted positions.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

- Place both drive systems in 'Single' mode of operation.
- Start system operations.

Acceptance Criteria

- Gripper jaws on Pull Heads 'A' and 'B' open.
- Pull Head 'A' and 'B' are fully extended (West).
- Gripper jaws on Pull Heads 'A' and 'B' close.

Pull Heads 'A' and 'B' are retracted (East) to the first 'Hold Point' $16.00 \pm .25$ inches) and motors stop.

Test Conductor E. B. Farnest Date 7/7/92

QA L. K. Sullivan Date 7/7/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

TPN#3
6/30/92

5. Press 'Camera Call' on control screen and evaluate CCTV performance by completing Camera assessment form in Appendix E.

Acceptance Criteria

RL #4
gmp
7/7/92

- Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- Pan, tilt, and zoom are functional.
- A clear unobstructive view of the lower clamp assembly on the clamping table can be achieved.

Test Conductor ES Forest Date 7/7/92
QA W. H. H. H. Date 7/7/92

6. Press 'Continue' on control screen.

Acceptance Criteria

- Pull Heads 'A' and 'B' are retracted (East) to the second 'Hold Point' (176 ± .25 inches) and motors stop.

Test Conductor ES Forest Date 7/7/92
QA W. H. H. H. Date 7/7/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

7. Press 'Camera Call' on control screen and evaluate CCTV performance by completing camera assessment form in Appendix E.

Acceptance Criteria

RL #14
7/7/92
gmp

- Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- Cameras can be positioned to achieve clear unobstructive view of the Pull Heads 'A' and 'B' and fuel rod interfaces (grippers) to determine the number of rods extracted.

Test Conductor ES Forest Date 7/7/92
QA W. H. H. H. Date 7/7/92

8. Enter a fictitious number of rods pulled into the accountability system and press 'Continue' on control screen.

Acceptance Criteria

- All grippers on both Pull Heads 'A' and 'B' are open.
- Pull Heads 'A' and 'B' are retracted (East) to their full retracted position.
- 'Hold Point' generated.

Test Conductor E. J. Forest Date 7/7/92
QA L. J. [Signature] Date 7/7/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

9. Press 'Camera Call' on control screen and evaluate CCTV performance by completing camera assessment form in Appendix E.

Acceptance Criteria

RL #4
7/7/92
EJF

- Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- Cameras can be positioned to achieve a clear unobstructed view of the jaw/fuel rod interfaces to verify all rods are released.

Test Conductor E. J. Forest Date 7/7/92
QA L. J. [Signature] Date 7/7/92

10. Press 'Continue' on control screen.

Acceptance Criteria

- Signal is generated to Side Transfer System.

Test Conductor E. J. Forest Date 7/7/92
QA L. J. [Signature] Date 7/7/92

11. All Steps 1 thru 10 above have been completed.

Test Conductor E. J. Forest Date 7/7/92

8.1.6.2 Verify Fuel Rod Extraction System (Carriage 'A' and 'B') 'Auto' mode of operation as follows:

- N/A 1. ~~Place both drive systems (M 107A and M 107B) in 'HAND' mode of operation.~~
- N/A 2. ~~Drive both systems to their fully retracted positions.~~

TDCN 5
VVA
8/6/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

3. Place both drive systems in 'Auto' mode of operation.
4. Start system operations.

Acceptance Criteria

- Gripper jaws on Pull Heads 'A' and 'B' open.
- Pull Head 'A' and 'B' are fully extended (West).
- Gripper jaws on Pull Heads 'A' and 'B' close.
- Pull Heads 'A' and 'B' are retracted (East) to the first 'Hold Point' ~~(5.00 ± .25 inches)~~ and motors stop.

TDCN #3
VVA
6/30/92

Test Conductor E. J. Forrest Date 7/7/92

QA M. J. K. [Signature] Date 7/7/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

5. Press 'Camera Call' on control screen.

Acceptance Criteria

RL #4
VVA
7/7/92

1. Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- Pan, tilt, and zoom are functional.
- A clear unobstructive view of the lower clamp assembly on the clamping table can be achieved.

Test Conductor E. J. Forrest Date 7/7/92

QA M. J. K. [Signature] Date 7/7/92

6. Press 'Continue' on control screen.

Acceptance Criteria

- Pull Heads 'A' and 'B' are retracted (East) to the second 'Hold Point' ($176 \pm .25$ inches) and motors stop.

Test Conductor *Eric Forest* Date *7/7/92*

QA *A. M. [signature]* Date *7/7/92*

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

7. Press 'Camera Call' on control screen.

Acceptance Criteria

RL #4
EMF
7/7/92

- 1. Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- Cameras can be positioned to achieve clear unobstructive view of the Pull Heads 'A' and 'B' and fuel rod interfaces (grippers) to determine the number of rods extracted.

Test Conductor *Eric Forest* Date *7/7/92*

QA *A. M. [signature]* Date *7/7/92*

- 8. Enter a fictitious number of rods pulled into the accountability system and press 'Continue' on control screen.

Acceptance Criteria

- All grippers on both Pull Heads 'A' and 'B' are open.
- Pull Heads 'A' and 'B' are retracted (East) to their full retracted position.
- 'Hold Point' generated.

Test Conductor *Eric Forest* Date *7/7/92*

QA *A. M. [signature]* Date *7/7/92*

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

9. Press 'Camera Call' on control screen.

Acceptance Criteria

Rev'd
JEC
8/6/92

- Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- Cameras can be positioned to achieve a clear unobstructed view of the jaw/fuel rod interfaces to verify all rods are released.

Test Conductor

ES Forest

Date

7/7/92

QA

W. M. Lynch

Date

7/7/92

10. Press 'Continue' on control screen.

Acceptance Criteria

- Signal is generated to Side Transfer System.

Test Conductor

ES Forest

Date

7/7/92

QA

W. M. Lynch

Date

7/7/92

11. All Steps 1 thru 10 above have been completed.

Test Conductor

ES Forest

Date

7/7/92

8.1.7 Fuel Assembly and Rod Pull Head Line Up Test

8.1.7.1 Verify extraction operations for normal fuel assemblies.

NOTE

The following test sequence (8.1.7.1) can be performed with mockup fuel assemblies if there are two in which the upper end fittings has been removed.

1. Line up 34 test rods with the proper diameter and center to center spacing as the W 17X17 fuel assembly on the clamping table. Place 17 rods in each clamp position (No. 1 and No. 2) at the proper elevation for extraction operations. Position any two rods at each clamp position such that they extend east two inches +0, -.10 inches from the other rods.

2. Place the Rod Extraction System Carriage 'A' and 'B' in single mode.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

3. Start system operations.

Acceptance Criteria

- Gripper jaws open.
- Pull heads are fully extended (West) onto all rods.
- Gripper jaws close on all rods accommodating a 2.00 inch offset in the rods.
- Pull heads with the test rods were retracted (East) to first 'Hold Point'.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

Test Conductor

E. B. Fink

Date

7/7/92

QA

A. G. Fink

Date

7/7/92

4. Press 'Camera Call' on control screen and determine via the CCTV system if test rods were retracted. Then verify the results.

Acceptance Criteria

- Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- The operator via the CCTV system was able to determine the correct number of rods pulled.

NOTE

All 34 test rods should be retracted. If they are not, evaluate cause before proceeding to next step in the test sequence.

Test Conductor S.B. Forest Date 7/7/92

QA D. J. [Signature] Date 7/7/92

5. Press 'CONTINUE' on control screen.

Acceptance Criteria

- Pull head with the test rods were retracted to second 'Hold Point'.

Test Conductor S.B. Forest Date 7/7/92

QA D. J. [Signature] Date 7/7/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

6. Press 'Camera Call' on control screen and determine via the CCTV system the number of rods extracted. Then verify the results.

Acceptance Criteria

- Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- The operator via the CCTV system was able to determine the correct number of rods extracted.

RL #4
SNP
7/7/92

NOTE

All 34 test rods should be retracted and still held firmly within the grippers. If they are not, evaluate cause before proceeding to next step in the test sequence.

Test Conductor S.B. Forest Date 7/7/92

QA D. J. [Signature] Date 7/7/92

7. Enter the number of test rods pulled into the accountability system and press 'Continue' on control screen.

Acceptance Criteria

- All grippers on both Pull Heads 'A' and 'B' open.
- Pull Heads 'A' and 'B' are retracted to their full retracted position releasing all test rods.
- 'Hold point' generated.

RL 5
SMF
7/7/92

Test Conductor E. J. Farnett Date 7/7/92
QA V. J. Mulgrew Date 7/7/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

8. Press 'Camera Call' on control screen and verify via the CCTV that all rods were released from the grippers. Then verify the results.

Acceptance Criteria

RL #4
SMF
7/7/92

- Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- The operator via the CCTV system was able to verify which rods were released.

Test Conductor E. J. Farnett Date 7/7/92
QA V. J. Mulgrew Date 7/7/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

9. Press 'Continue' on control screen.

Acceptance Criteria

- Signal is generated to side transfer system.

Test Conductor E. J. Farnett Date 7/7/92
QA V. J. Mulgrew Date 7/7/92

10. All Test Steps 1 thru 9 above have been completed.

Test Conductor E. J. Farnett Date 7/7/92
QA V. J. Mulgrew Date 7/7/92

8.1.7.2 Verify extraction operations for 1.5 inch bowed fuel assemblies.

NOTE

The following test sequence (8.1.7.2) can be performed with mockup fuel assemblies if there are two in which the upper end fittings has been removed.

1. Repeat the identical set up as defined in Test Step 1 of Section 8.1.7.1 of this test procedure except place a 1.5 inch thick shim under each rod at their center point along the length of the rods to simulate a 1.5 inch bowed assembly.
2. Place the Rod Extraction System Carriage 'A' and 'B' in single mode.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

3. Start system operations.

Acceptance Criteria

- Gripper jaws open.
- Pull heads are fully extended (West) onto all rods.
- Gripper jaws close on all rods accommodating a 2.0 inch offset in the rods.
- Pull heads with the test rods were retracted (East) to first 'Hold Point'.

Test Conductor

E. J. Forest

Date

7/8/92

QA

W. J. G. G. G.

Date

7/8/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

4. Press 'Camera Call' on control screen and determine via the CCTV system if test rods were retracted. Then verify the results.

Acceptance Criteria

- Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- The operator via the CCTV system was able to determine the correct number of rods pulled.

NOTE

All 34 test rods should be retracted. If they are not, evaluate cause before proceeding to next step in the test sequence.

Test Conductor E. J. Farnest Date 7/8/92

QA A. G. G. G. Date 7/8/92

5. Press 'CONTINUE' on control screen.

Acceptance Criteria

- Pull head with the test rods were retracted to second 'Hold Point'.

Test Conductor E. J. Farnest Date 7/8/92

QA A. G. G. G. Date 7/8/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

6. Press 'Camera Call' on control screen and determine via the CCTV system the number of rods extracted. Then verify the results.

Acceptance Criteria

- Video images from Cameras No. 7 and No. 8 are displayed on monitors.
- The operator via the CCTV system was able to determine the correct number of rods extracted.

PL #4
S. B. F.
7/8/92

NOTE

All 34 test rods should be retracted and still held firmly within the grippers. If they are not, evaluate cause before proceeding to next step in the test sequence.

Test Conductor E. J. Farnest Date 7/8/92

QA A. G. G. G. Date 7/8/92

7. Enter the number of test rods pulled into the accountability system and press 'Continue' on control screen.

Acceptance Criteria

- All grippers on both Pull Heads 'A' and 'B' open.
- Pull Heads 'A' and 'B' are retracted to their full retracted position releasing all test rods.
- 'Hold point' generated.

Test Conductor E. J. Furest Date 7/8/92

QA M. J. Furest Date 7/8/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

8. Press 'Camera Call' on control screen and verify via the CCTV that all rods were released from the grippers. Then verify the results.

Acceptance Criteria

- PL #4
238
7/8/92
- 1. Video images from Cameras No. 7 and No. 8 are displayed on monitors.
 - The operator via the CCTV system was able to verify which rods were released.

Test Conductor E. J. Furest Date 7/8/92

QA M. J. Furest Date 7/8/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

9. Press 'Continue' on control screen.

Acceptance Criteria

- Signal is generated to side transfer system.

Test Conductor E. J. Furest Date 7/8/92

QA M. J. Furest Date 7/8/92

10. All Test Steps 1 thru 9 above have been completed.

Test Conductor E. J. Furest Date 7/8/92

QA M. J. Furest Date 7/8/92

8.1.8 Servo Drive Fault Test

NOTE

It is not necessary to take photographs of the 'Hold Points' during this test sequence.

1. Place the Rod Extraction System in the 'Single' mode of operation and initiate operations.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

2. During operation alter the control system software to implement a torque fault in drive motor (M-107A).

Acceptance Criteria

- Motor stops when fault is implemented.
- Alarm system is activated.
- Alarm is silenced when acknowledged by operator.
- Control system displays fault condition on control screen.

Test Conductor Eon Forest Date 7/5/92

QA V. M. [Signature] Date 7/5/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

3. Cause the system to print a report of fault condition.

Acceptance Criteria

- TRW
W.C.
01/7/92
- Report is generated defining fault condition ~~when commanded by operator.~~

Test Conductor Eon Forest Date 7/5/92

QA V. M. [Signature] Date 7/5/92

9.0 POST PERFORMANCE REVIEW AND APPROVAL

The following signatures certify that the completed test, with all data collected, has been reviewed, and that the system has passed the requirements for system operational test.

reference Open Station Tracking, list TPCW4 attachment 19.

Test Engineer 9/25/92
Date

Quality Assurance 9/29/92
Date

Project Engineer 10/6/92
Date

Test Director 10/6/92
Date

10.0 RETENTION OF TEST RECORDS

The original working copy, including test exceptions and resolution and acceptance signatures, are to be maintained by the Test Director and stored at the NUS Gaithersburg building, Document Control Center. One copy of the original working document shall be sent to the DOE representative for their use and retention.

11.0 REFERENCES

- 11.1 9315-P-120 "Test Administration Manual for Systems Operations Test and Integrated Systems Tests, latest revision.
- 11.2 9315-E-601 "Software Functional Specification", latest revision.
- 11.3 DWG 9315-M-0012
- 11.4 DWG 9315-M-2201
- 11.5 DWG 9315-M-2206

TEST PROCEDURE	9315-TP-201	REVISION	0	PAGE	4-1
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APPENDIX A
EQUIPMENT SETUP

A.1 Rod Extraction System 'A' Carriage Setup.

A.1.1 Verify that the Rod Extraction "A" Carriage is at least 6 inches away from the end of travel mechanical stops.

A.1.2 Set the motor control parameters for motor, M107A, per the instructions from Modicon. Record these parameters on the attached servo drive parameter form. The following calculations will assist in determining these parameters.

A.1.2.1 Determine the motor operating speed in resolver counts per second by applying the following formula.

$$M = \text{Motor speed (counts/sec)} = 1,868 \text{ rpm} \times \frac{1000}{60} \text{ counts/rev.} \times 1 \text{ min/60 sec}$$

$$M = \underline{31133} \text{ counts/second}$$

A.1.2.2 Determine the linear acceleration (or starting rate) in resolver counts per second² by applying the following formula. The time to achieve the operating speed is 't' seconds.

$$\text{Accel} = \frac{M}{t}$$

$$t = \underline{\hspace{2cm}} \text{ seconds}$$
$$\text{Accel} = \underline{\hspace{2cm}} \text{ counts/second}^2$$

A.1.2.3 Determine the linear deceleration (or stopping rate) by applying the following formula. The time to stop from the operating speed is selected to be the same time selected in step A.1.1.2.2 above.

$$\text{Decel} = \frac{M}{t}$$

$$\text{Decel} = \underline{\hspace{2cm}} \text{ counts/second}^2$$

Axis personality record form:

Machine Name/Number: Rod Extraction Carriage 'A'

Axis Number: M-107A

Personality Variable	Projected Value	Final Value
Number of Motor Poles (NPOLES)	6	
Resolution (RES)	1000	
Rate Loop Proportional Gain (RPG)	15	
Rate Loop Integral Gain (RIG)	150	
Acceleration Time Constant (ATC)	236	
Following Error Limit (FE_LIM)	500000	
Peak Current Limit (IMAX)	100	
Average Current Trip Level (IAVG_LIM)	40	
CW End-of-Travel Limit (+EOT)	0	
CCW End-of-Travel Limit (-EOT)	0	
In-Position Tolerance Band (POS_TOL)	20	
In-Sync Tolerance Band (SYNC_TOL)	500	
Linear Acceleration (ACCEL)	5000	
Linear Deceleration (DECEL)	5000	
Position Cmd Time Constant (PCTC)	N/A	
Velocity Feed Forward (VFF) on/off	N/A	
Motor Base Speed (BASE_SPD)	3600	

- 2 Rod Extraction Carriage System 'B' Carriage Setup.
- 2.1 Repeat steps A.1.1.1 thru A.1.1.2 above for Rod Extraction 'B' Carriage.
- 3 Pull Head carriage 'A and B' proximity switch setup and setup of drive system operating position.
- 3.1 From the control console, call up the rod extraction system screen.
- 3.2 Install the two Westinghouse 17 x 17 gripper assemblies into the A and B carriages.
- 3.3 From the control console, place the rod extraction system in the "Jog" mode of control at 30% speed.

Axis personality record form:

Machine Name/Number: Rod Extraction Carriage 'B'

Axis Number: M-I07B

Personality Variable	Projected Value	Final Value
Number of Motor Poles (NPOLES)	6	
Resolution (RES)	1000	
Rate Loop Proportional Gain (RPG)	18	
Rate Loop Integral Gain (RIG)	150	
Acceleration Time Constant (ATC)	236	
Following Error Limit (FE_LIM)	500000	
Peak Current Limit (IMAX)	100	
Average Current Trip Level (Iavg_LIM)	40	
CW End-of-Travel Limit (+EOT)	0	
CCW End-of-Travel Limit (-EOT)	0	
In-Position Tolerance Band (POS_TOL)	20	
In-Sync Tolerance Band (SYNC_TOL)	500	
Linear Acceleration (ACCEL)	5000	
Linear Deceleration (DECEL)	5000	
Position Cmd Time Constant (PCTC)	N/A	
Velocity Feed Forward (VFF) on/off	N/A	
Motor Base Speed (BASE_SPD)	3600	

A.3.4 Drive the carriage in the extend (~~East~~ ^{west} ~~hard~~) direction until the tips of the pull head grippers are greater than 2.0 inches east of the reference cut line but have not engaged the end of travel hard stops. Set the proximity switch ZE-107B to trip at this point. Measure and record the actual setting of the proximity switch.

Proximity Switch ZE-107B set point -2 3/4 west of Cut-Line To Tips.

A.3.5 Set proximity switch ZE-107D for pull head carriage 'B' following the instruction of step A.3.4 above.

Proximity Switch ZE-107D set point 2 7/8 2 9/8"

A.3.6 Reverse motor direction and drive pull head carriage 'A' in retract (~~West~~ ^{EAST}) direction until the tips of the pull head grippers are $2.00 \pm .06$ inches east of the reference cut line. Cause the control system to store this resolver reading as the full extend position for the pull head carriage 'A' drive system. Record the actual position.

Full extend position of Carriage 'A' _____

A.3.7 Continue to drive pull head Carriage 'A' in the retracted (~~West~~ ^{EAST}) position and cause the control system to store the following positions:

- 1st 'Hold Point' - ^{1.00}~~6.00~~ $\pm .25$ inches
- 2nd 'Hold Point' - $176.00 \pm .25$ inches
- Full retract position - $180.00 \pm .25$ inches

Record actual positions set.

- 1st 'Hold Point' _____
- 2nd 'Hold Point' _____
- Full retract position _____

A.3.8 Position proximity switch ZE-107A midway between the full retracted position of the carriage and the end of travel hard stop. Record actual position of proximity switch.

End of travel proximity switch ZE-107A position _____

A.3.9 Repeat steps A.3.6 thru A.3.8 above for pull head Carriage 'B' drive system.

- Full extend position of Carriage 'A' _____
- 1st 'Hold Point' _____
- Full retracted position _____
- End of Travel Proximity Switch ZE-107C _____

A.4 Creation of AXIS Homing Sequence (AHS) for 'A' axis.

A.4.1 Create and verify an Axis Homing Sequence (AHS) for the Carriage 'A' Drive Motor (M-107A). (See "Start Program" in the Software Detail Design Document by Modicon.) AHS parameters to be as given below. At completion of AHS, record "Home Offset" and "Final Home Position" in the chart below.

Motor Tag No. M-107A Home Direction: CCW (EAST)

Resolver Tag No.: GE-107A Resolver Counts/Turn: 1000

Home Speed: 60 ~~1000~~ RPM 1000 counts/sec.

Home Offset: 1000 Resolver Counts

Final Home Position: 180.75
180.00 ± .25 inch ?

A.5 Creation of AXIS Homing Sequence (AHS) for 'B' axis.

A.5.1 Create and verify and Axis Homing Sequence (AHS) for the Carriage 'B' Drive Motor (M-107B and resolver (GE-107B). (See "Start Program" in the Software Detail Design Document by Modicon.) AHS parameters to be as given below. At completion of AHS, record "Home Offset" and "Final Home Position" in the chart below.

Motor Tag No. M-107A Home Direction: CCW (EAST)

Resolver Tag No.: GE-107A Resolver Counts/Turn: 1000

Home Speed: 60 RPM 1000 counts/sec.

Home Offset: 1000 Resolver Counts

Final Home Position: 180.00 ± .25 inch
-180.75 ?

APPENDIX B
SAFETY PROCEDURES

2 of 7

SYSTEMS OPERATIONS TEST SAFETY CONSIDERATIONS

Performance of the SOTs in a manner which precludes the injury of personnel involved in the test performance or working in the Test Facility is of paramount importance. The following steps shall be taken to minimize the possibility of personnel being injured during the performance of SOTs:

1. Contraves and NUS will advise their employees and any subcontractors to stay clear of the Test Facility when tests are being conducted unless they are involved in the test performance or have another work assignment in the Test Facility.
2. Contraves will post a warning sign at the entrance to the Test Facility when testing is in progress advising personnel of the need to stay away unless involved in the testing or have some authorized work assignment in the area.
3. When feasible and deemed advisable by the Test Conductor the machine being tested will be surrounded by a portable barrier (ropes and posts) with a Caution Sign warning individuals to stay clear of the area unless authorized to enter by the Test Conductor.
4. When machines are being moved by installed motors the NUS electrical engineer operating the motor or the Test Conductor will be located in a position which permits him/her to observe the machine operation so that the equipment can be stopped if a dangerous situation appears to be developing. Such situations could involve unanticipated machine performance or personnel entering the test area and placing themselves in jeopardy.
5. When an SOT is in progress the Test Conductor will remain in the vicinity of the test so the all personnel involved in the test are under his observation and will perform any required test support activities directly under his supervision.
6. Only Contraves personnel who have been qualified to the DOE Hoisting and Rigging Manual Rev. 10-88 will operate the Test Facility overhead crane.
7. Only NUS test engineers will operate the Robotic Bridge Transporter (RBT), the Manipulator Transporter (MT), and the RM-10A Robot Arms.
8. Slings, hooks, and chains utilized with the Test Facility overhead crane or with the RBT will be those purchased specifically for use on the DOE project and have been certified to meet the requirements of ANSI B30.9.
9. The making of all electrical connections to the various equipment will be supervised by an NUS electrical engineer.

10. Protective headgear will be worn in the Test Facility when ever the Robotic Bridge Transporter (RBT) the Manipulator Transporter (MT) are being utilized or at any time the Test Conductor deems the use of protective head gear is appropriate.
11. The NUS Test Conductor is responsible to see that all the above safety requirements are implemented during the performance of the test for which he has responsibility.
12. The Test Conductor will verify that all test specific safety prerequisites identified in test procedures are satisfied and that any precautions identified in specific procedure steps as followed.
13. The NUS Test Director will perform frequent informal surveillance of the testing operations to verify the safety requirements are being adhered to by the personnel performing the test or other work in the test area.

APPENDIX C

PHOTO DOCUMENTATION REQUIREMENTS

Photo Documentation Requirements

Photographs are required to be taken of all System Operational Tests (SOTs). The following is a bulletized list which identifies when these photographs must be taken, as a minimum. Additional photographs may be taken at any other time during the test, as specified by the Test Conductor.

- Photographs must be taken of the initial setup for each test sequence.
- Photographs must be taken of the following critical interfaces between system, as a minimum,
 - Excell Crane/Downender (Loading of Fuel)
 - RBT/Fuel Assembly Storage Rack
 - RBT/Downender
 - RBT/Staging and Cutting Station
 - RBT/Clamping Table
 - FAHF/Mockup Fuel Assembly
 - Pull-Head Gripper/Fuel Rods
 - Rod Loader/Canister
 - NFBC Loader/Canister
 - RBT/Off-Normal Table
 - MT/Off-Normal Table
 - Fuel Canister/Storage Rack
 - NFBC Canister/Storage Rack
 - RBT/FAHF and RM-10A
 - Excell Crane/Fuel Canister Upender (Loading and Unloading)
 - Excell Crane/NFBC Canister Upender (Loading and Unloading)
 - MT/RM-10A
- Photographs must be taken of any equipment damaged during testing.
- Photographs must be taken of any damage to mockup fuel rods and/or mockup fuel assemblies.
- Photographs must be taken of the cutter to fuel assembly interfaces as follows:
 - In position prior to cut
 - During cutting operation
 - Cut area of end fitting after cut operation
 - Cut area of fuel assembly after cut operation
- Photographs must be taken of each "Hold Point".
- Photographs must be taken of the problem areas of any subsystem which does not perform its expected function.
- Photographs must be taken of any component, subsystem, or system, determined by the test conductor to be operating out of the normal/expected condition (i.e., excessive deflection, vibration, etc.).

FUEL ROD CONSOLIDATION PROJECT
PHOTOGRAPHIC LOG

TEST PROCEDURE No. 201

[illegible]

TEST PROCEDURE	9315-TP-201	REVISION	0	PAGE 0-1
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APPENDIX D

TEMPORARY PROCEDURE CHANGE NOTICE AND REPAIR LOG

EST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE # 1

DATE 4/27/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rod Extraction

PROCEDURE SECTION(S) Page 39-45 8.2, 8.3, 8.4, and 8.5 ^{ver} 8/6/92

PROCEDURE CHANGE: (Use reverse side if necessary.)

Delete sections on W 15x15, Btu 15x15,
CE 14x14 and GE 8x8 due to program
changes.

REASON FOR CHANGE:

Re Focused Phase III test program excludes redundant testing
of other Fuel type ^{ver} 8/6/92

CLASSIFICATION OF CHANGE

Does not demonstrate Criteria 1.4 and
1.7 For other Fuel types ^{ver} 8/6/92

MINOR YES NO

MAJOR YES ☒ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

David McChapman 8/6/92 (1)(2)
TEST ENGINEER DATE

Peter J. Hall 9/29/92 (2)
QUALITY ASSURANCE DATE

Frank M. Hall 10/6/92 (2)
PROJECT ENGINEER DATE

[Signature] 10/6/92 (2)
TEST DIRECTOR DATE

- Notes: (1) Required for minor changes
(2) Required for major changes

HALLIBURTON LOG
Environmental Corporation

PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE # 2

E 6/30/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE ROD EXTRACTION

PROCEDURE SECTION(S) MULTIPLE 6.3, Page 4, 8.1

PROCEDURE CHANGE: (Use reverse side if necessary.)

DELETE REQUIREMENTS AND REFERENCES
PERTAINING TO TORQUE OR MOTOR CURRENT
MEASUREMENTS

Delete 6.3, Page 4 Delete Drill Motor Torque entries on Page 10 (twice), Page 11, Page 12, Page 13 (twice),
Page 14 (twice), and Page 15 (three times) 6/30/92

REASON FOR CHANGE:

Torque and motor current measurements are deleted from the Phase III test program.
See TAC Change Notice 001 6/30/92

CLASSIFICATION OF CHANGE

MINOR YES NO

MAJOR YES ☒ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

Erin Farrell 6/30/92 (1)(2)
TEST ENGINEER DATE
Peter V. Juhl 9/29/92 (2)
QUALITY ASSURANCE DATE
Frank M. Ball 10/6/92 (2)
PROJECT ENGINEER DATE
[Signature] 10/6/92 (2)
TEST DIRECTOR DATE

- Notes: (1) Required for minor changes
(2) Required for major changes

HALLIBURTON NUS
Environmental Corporation

PROCEDURE

9315-TP-201

REVISION

0

APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

TPN #3

6/30/92

PROCEDURE NO. 9315-TP-201

REV. 0

TITLE Road Extraction

PROCEDURE SECTION(S)

8.1 ^{10/19/92}

PROCEDURE CHANGE: (Use reverse side if necessary.)

6.0 ± 25 inch measurement changed to 1.0 ± 25 inches
multiple places.

Page 10, 12, 13, 25, 28 ^{10/19/92}

REASON FOR CHANGE:

Setpoint was revised so that the first hold point did not pull rods part the
lower grid. See TAC Change Notice 001 ^{10/19/92}

CLASSIFICATION OF CHANGE

MINOR ☐ YES ☐ NO ☐

MAJOR ☐ YES ☒ NO ^{10/19/92}

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

<u>ErB Forest</u>	6/30/92 (1)(2)
TEST ENGINEER	DATE
<u>Peter J. Judd</u>	9/29/92 (2)
QUALITY ASSURANCE	DATE
<u>Frank M. Bello</u>	10/6/92 (2)
PROJECT ENGINEER	DATE
<u>[Signature]</u>	10/6/92 (2)
TEST DIRECTOR	DATE

- Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 8/6/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE _____

PROCEDURE SECTION(S) 8.1

PROCEDURE CHANGE: (Use reverse side if necessary.)

To complete Rod Extraction System SOT testing. See page 2 For coverage.
See pages 3 to 59 For detailed test steps.

No previous TPCN apply.

Reference RL #4 & 5

REASON FOR CHANGE:

TPC Change Notice 001 revised some acceptance criteria and this TPCN demonstrates these criteria. Previously undemonstrated criteria are also demonstrated.

CLASSIFICATION OF CHANGE

MINOR YES NO

MAJOR YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

<u>David M. Chapman</u>	<u>8/6/92</u>	(1)(2)
TEST ENGINEER	DATE	
<u>Phonse H. Mulgrew</u>	<u>8/18/92</u>	(2)
QUALITY ASSURANCE	DATE	
<u>Frank M. Galle</u>	<u>8/18/92</u>	(2)
PROJECT ENGINEER	DATE	
<u>Robert J. Jurek</u>	<u>8/18/92</u>	(2)
TEST DIRECTOR	DATE	

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 8/21/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE _____

PROCEDURE SECTION(S) 8.1

PROCEDURE CHANGE: (Use reverse side if necessary.)

Testing to complete Red Extraction System SOT testing.
See Pages 2 and 3 For coverage.
See Pages 4 to 60 For detailed test steps.
No other TPCN apply.
Reference ~~see~~ RL # 4 and 5

REASON FOR CHANGE:

TPC Change notice 001 revised some acceptance criteria. This TPCN procedure demonstrates the revised criteria. Previously undemonstrated criteria are also demonstrated. See Pages 2 & 3.

CLASSIFICATION OF CHANGE

MINOR ☐ YES ☐ NO ☐

MAJOR ☒ YES ☐ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

<u>Wing M. Chapman</u>	<u>8/21/92</u>	(1)(2)
TEST ENGINEER	DATE	
<u>W. W. L. L. L.</u>	<u>8/25/92</u>	(2)
QUALITY ASSURANCE	DATE	
<u>Frank D. Maillo</u>	<u>8/25/92</u>	(2)
PROJECT ENGINEER	DATE	
<u>Peter V. Jurek</u>	<u>8/25/92</u>	(2)
TEST DIRECTOR	DATE	

Notes: (1) Required for minor changes
(2) Required for major changes

This TPCN test procedure seeks to clarify and resolve issues developed during initial SOT testing of the Rod Extraction System. It also seeks to demonstrate certain acceptance criteria which were not demonstrated in the initial testing. TAC Change Notice No. 001 revises test acceptance criteria and should be considered in review of this TPCN.

Testing as per section 1.2 was performed at 50% of Jog Speed. The testing as per this TPCN will verify that, at 100% JOG Speed, hard stops are not contacted. After actuation of the sensor, the motor stops operating but inertia causes some coasting past the sensor. This testing will possibly further limit jog speed since proximity sensors are located as required for range of travel considerations.

The current proximity sensor location is adequate for protection in JOG mode operations. Jog Speed will be adjusted for the current position. However, processing operations at 180 ipm will cause a deficit of coast-down space. A design intent is that the proximity sensor provide protection for a run-away motor while operating in programmed modes. In the current design, a run-away motor would probably contact the hard stop after actuating the proximity sensor. The hard stops are designed to accommodate this situation so no damage would be expected. However, the non-contact design intent is not met in Phase III. This does not limit integrated system testing. Motor brakes or other solutions may be evaluated for Phase IV.

This TPCN will demonstrate the revised camera call criteria as per TAC Change Notice 001 and complete the CCTV assessment forms. Previous programming is revised by DCN 40 to obtain the required coverage. The revised first hold point's setpoint (currently set at 1 inch rather than 6 inches) will be verified to be adequate.

Testing as per Section 8.1.2 demonstrated that the first hold point was at one inch. CCTV coverage was not assessed for the first hold point at one inch. TAC Change Notice 001 changes the criteria to $1 \pm .25/+1.0$. Testing as per this TPCN is repeated only if the actual setpoint is changed for camera coverage.

The acceptance criteria for peak extraction speed of 120 to 130 inches per minute is revised by TAC Change Notice 001 to be in line with the throughput calculation and the revised hold point distances. Testing as per this TPCN will address the average extraction speed required to obtain throughput ratings.

This TPCN will demonstrate the acceptance criterion; "The differences between pull forces measured at the test fixture and the pull force recorded from the pullhead loadcell are constant." This was not demonstrated in the initial testing.

. This TPCN will test the installation of the gripper inserts which limit rod insertion length for reliable rod release. This TPCN will demonstrate that off-set and bowed rods can be accommodated by the grippers without the use of the programmed retry options and that bottomed-out rods are properly released.

. Exception/Repair Log #2 identified that pulling forces increase with increasing insertion lengths in the grippers. It was dispositioned to test at the design insertion value of 1/2 inch (as per the test log) or 3/4 inch (as per the RL). The acceptance criteria's 200 lb upper limit was subsequently demonstrated in the second cycle of testing. However, the design issue was not addressed. This test procedure demonstrates pulling forces at bottomed-out insertion lengths to either a 500 lb administrative limit or to determine the maximum insertion length usable in integrated system testing.

. A test log entry stated that an attempt would be made to make the rod extraction operation smoother. This implies that the jerk at the start of extraction pulls the rods out of the pull heads before an acceptable pull force was reached. While this comment was applicable to JOG Mode operations, it may also be applicable to programmed mode operations.

It is noted that the linear acceleration factor was set at 5000 in a range of 1 (extremely slow) to 2,000,000,000 (very fast) and that the acceleration time constant was set at 236 milliseconds in a range of 8 to 1024. No Position Command Time Constant is provided. This constant would limit the rate of change of acceleration.

This TPCN allows for initial checking of these parameters to qualitatively verify a "smooth" start. However, pull force testing in programmed operations cannot be performed without fuel assemblies or equivalent which could demonstrate pulling forces over distance.

. This TPCN will complete the CCTV Assessment form for the servo-drive-fault alarm test.

TPCN 4, Pages 4 to 60

Exception

TPCN

attachments

are included after the original test procedure documentation

Unzel M. Chapin

PRELIMINARY TEST STEPS

- 8.1.1 Verify that the Process Control System is downloaded for Westinghouse 17 X 17 fuel assemblies. Record program data.

PP02 020 5354 8-18-92 7:42 TO CONTROLLER #10
See Attachment 5 for Directory of C. MORRISON

David M. Olson 9/6/92
Test Conductor Date

- 8.1.2 Verify that the Accountability system indicates that there is NO accountable material on the Clamping Table, Rod Extraction System and Rod Compaction System.

David M. Olson 8/6/92
Test Conductor Date

- 8.1.3 Verify that the Rod Extraction System is homed.

David M. Olson 9/10/92
Test Conductor Date

- 8.1.4 Identify and record reference distances for the homed position (for future reference). Refer to reference drawings.

Pull Head Drive A M-107A: 4 1/2" distance between Fast face, outer lower corner of pull head assembly to west face of nearest rod support - the one with the added angle

Pull Head Drive B M-107B: 4 9/16" as above but to the lower corner

OF 9315-M-2201 Set 1 (47)

Clamping Table Elevation M-106I: N/A - data obtained by 9315-TP 202, IFCN 10

8.1.5

Obtain and attach a copy of the current motor parameter data for Pull Head Drive A M-107A and Pull Head Drive B M-107B.

ATTACHMENT: 12-3⁰⁰ 192**NOTE**

Camera controls are functional whenever the camera is selected at the camera controller on the console. This is independent of the source of the camera selection. Timed operations in the sequence testing below in Section 8.3 preclude the demonstration of all camera pan, tilt, and zoom control capabilities. In actual practice, the cameras will be more or less at the required operating position and may require minimal adjustments in one direction only for each control.

8.1.6

Ensure that the Manipulator Transporter is in it's safe position AND that CCTV Camera 3 has coverage at the lower Clamping Table.

8.1.7

Place CCTV Cameras 3, 4, 7, 8, 9, and 10 in service. Verify that available camera controls are functional for each camera as per 9315-TP-600 Section 8.6.

ATTACHMENT: 4

8.1.8

Acceptance Criteria

Camera controls are functional for cameras 3, 4, 7, 8, 9, and 10 as necessary to support this testing.

<u>David M. Ch...</u>	<u>9/8/92</u>
Test Conductor	Date
<u>Peter V. J...</u>	<u>9/8/92</u>
QA	Date

NOTE

The rate of increase in pulling force is related to pull head drive acceleration. A test log entry indicates that an effort will be made to make pulling smoother. The design intent is that the pull head drive should start slowly, then increase to speed, then gradually stop. The initial acceleration must be slow enough so as to avoid jerking, excessive force, and slippage.

8.1.9

Perform initial observations to verify or obtain a qualitatively smooth start for the extraction operation. Record any required changes made to motor operating parameters. Record any observations.

Head Extend: Rate of Speeds from 25000-10000 to 31133 CPS 9/11/92
No unusual noises or vibrations were observed. Drive motor is somewhat
louder than M167A but is no problem as per Project Engineer. See Data below 8.1.10

8.1.10

Verify that the start of extraction operations is qualitatively smooth and continuous.

Virginia E. Lopez 9/11/92
 Test Conductor Date

Note: Position indications for M167A at position set points

Extend	0.299 in	} $\Delta = 1.164"$ } $\Delta = 174.855"$ } $\Delta = 4.073"$	} Same as field measurements within the limit of measurement error
1 st HP	1.463 in		
2 nd HP	176.318 in		
3 rd HP	180.391 in		
HOME	181.070 in		

VNE
9/13/92

Note: Times for delayed motion

	Extend	M167A	M167B	Avg	Avg Velocity
1 st HP	105.29 sec	104.94 sec	105.12 sec	~163 ipm	
2 nd HP	1.95 sec	2.66 sec	2.31	~30 ipm	
3 rd HP	101.38 sec	103.84 sec	103.61	~101 ipm	
	6.35 sec	5.87 sec	6.11	~384 ipm	

right

8.2

PROXIMITY SWITCH VERIFICATION AT 100% JOG SPEED**NOTE**

Initial testing as per TP Section 8.1.1 verified the operation of the proximity sensors at 50% of JOG Speed but did not progress to 100% speed. Test log entries indicated that the drive speed limit was reduced to meet the functional criteria. This speed reduction was implemented for programmed operations as well as JOG mode operations. The proximity sensors are located as required for the operational range of travel. The JOG Speed limit must be such that, at 100% JOG Speed actuation, the hard stop is not contacted. The peak programmed operation speed must not be affected by any limitation in the maximum available JOG Speed in Phase III testing.

CAUTION

All personnel should remain clear of the carriage while in operation. Visually verify that all observers are clear before performing drive operations.

WARNING

Care must be exercised in the operation of the pull head drive carriage in the JOG Mode. Do not intentionally contact the hard stop at full speed.

- 8.2.1 Verify that the programmed operation speed is not reduced, that is, that the design 181 ipm pull head carriage drive speed is available. Record the current programmed-operations speed setpoint.

PROGRAMMED OPERATIONS SPEED SETPOINT: 31,133 cps (~180 ipm)

William Chapman 9/1/92
Test Conductor Date

- 8.2.2 Verify that the JOG Speed is limited to about 1/2 the current limit. Record the revised JOG Speed setpoint.

JOG MODE OPERATIONS SPEED SETPOINT: 5000

William Chapman 9/1/92
Test Conductor Date

- 8.2.3 Place the Rod Extraction System in the JOG Mode.

- 8.2.4 Place the Rod Extraction JOG SPEED at 100%.

NOTE

It is recommended that the worst-case end of travel be performed first for Pull Head Drive M-107A.

Pull Head Drive A M-107A West End-of-Travel

- 8.2.5 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, place the drive at a midtravel location.

NOTE

Monitor locally for contact with the hard stop.

NOTE

The JOG Pushbutton is used in this testing to avoid speed complications using the joystick.

- 8.2.6 Operate PULL HEAD DRIVE A M-107A forward (West) using the JOG Pushbutton until the proximity sensor is actuated.
- 8.2.7 Verify that the Process Control System indicates that the West end-of-travel proximity sensor has been actuated.

David M. Chen 9/1/92
Test Conductor Date

- 8.2.8 Verify that PULL HEAD DRIVE A M-107A stops operating in the forward (West) direction.

David M. Chen 9/1/92
Test Conductor Date

- 8.2.9 Verify that PULL HEAD DRIVE A M-107A does NOT contact the West end-of-travel hard stop when operating at 100% JOG SPEED.

David M. Chen 9/1/92
Test Conductor Date

- 8.2.10 Obtain one still photograph of the Pull Head Drive near the West hard stop.

PHOTO: Roll 15
31120

- 8.2.11 Note, for information only, using a tape measure, the clearance from the West hard stop.

WEST END-OF-TRAVEL CLEARANCE: 1/32"

- 8.2.12 Record the Process Control System indications for West end-of-travel proximity switch actuation:

Green EOT indicator illuminated
EOT Fault illuminated
EOT Alarm message

Pull Head Drive A M-107A East End-of-Travel

- 8.2.13 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, place the drive at a midtravel location.

NOTE

Monitor locally for contact with the hard stop.

NOTE

The JOG Pushbutton is used in this testing to avoid speed complications using the joystick.

- 8.2.14 Operate PULL HEAD DRIVE A M-107A back (East) using the JOG Pushbutton until the proximity sensor is actuated.
- 8.2.15 Verify that the Process Control System indicates that the East end-of-travel proximity sensor has been actuated.

David M. Chen 9/1/92
Test Conductor Date

- 8.2.16 Verify that PULL HEAD DRIVE A M-107A stops operating in the back (East) direction.

David M. Chen 9/1/92
Test Conductor Date

- 8.2.17 Verify that PULL HEAD DRIVE A M-107A does NOT contact the East end-of-travel hard stop when operating at 100% JOG SPEED.

David M. Chen 9/1/92
Test Conductor Date

- 8.2.18 Obtain one still photograph of the Pull Head Drive near the East hard stop.

PHOTO: R_1115 #17

- 8.2.19 Note, for information only, using a tape measure, the clearance from the East hard stop.

EAST END-OF-TRAVEL CLEARANCE: 15/8

- 8.2.20 Record the Process Control System indications for East end-of-travel proximity switch actuation:

Green BACK indicator illuminated
EOT Fault illuminated
EOT alarm message on

- 8.2.21 After testing both ends of travel, note the JOG Mode speed limit setpoint for PULL HEAD DRIVE A M-107A for operations at the both end-of-travel.

PULL HEAD DRIVE A JOG SPEED SETPOINT: 5,000

NOTE

It is recommended that the worst-case end of travel be performed first for Pull Head Drive M-107B.

Pull Head Drive B M-107B West End-of-Travel

- 8.2.22 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, place the drive at a midtravel location.

NOTE

Monitor locally for contact with the hard stop.

NOTE

The JOG Pushbutton is used in this testing to avoid speed complications using the joystick.

- 8.2.23 Operate PULL HEAD DRIVE B M-107B forward (West) using the JOG Pushbutton until the proximity sensor is actuated.
- 8.2.24 Verify that the Process Control System indicates that the West end-of-travel proximity sensor has been actuated.

Daniel M. Cha 9/1/92
Test Conductor Date

- 8.2.25 Verify that PULL HEAD DRIVE B M-107B stops operating in the forward (West) direction.

Daniel M. Cha 9/1/92
Test Conductor Date

- 8.2.26 Verify that PULL HEAD DRIVE B M-107B does NOT contact the West end-of-travel hard stop when operating at 100% JOG SPEED.

Daniel M. Cha 9/1/92
Test Conductor Date

- 8.2.27 Obtain one still photograph of the Pull Head Drive near the West hard stop.

PHOTO: RA15 19

- 8.2.28 Note, for information only, using a tape measure, the clearance from the West hard stop.

WEST END-OF-TRAVEL CLEARANCE: 3/16"

- 8.2.29 Record the Process Control System indications for West end-of-travel proximity switch actuation:

*1-23
-41/12*

~~Green~~ BAGE indicator illuminated

Fault light OK

Message OK

Pull Head Drive B M-107B East End-of-Travel

- 8.2.30 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, place the drive at a midtravel location.

NOTE

Monitor locally for contact with the hard stop.

NOTE

The JOG Pushbutton is used in this testing to avoid speed complications using the joystick.

- 8.2.31 Operate PULL HEAD DRIVE B M-107B back (East) using the JOG Pushbutton until the proximity sensor is actuated.

- 8.2.32 Verify that the Process Control System indicates that the East end-of-travel proximity sensor has been actuated.

Wing M Chen 9/1/92
Test Conductor Date

- 8.2.33 Verify that PULL HEAD DRIVE B M-107B stops operating in the back (East) direction.

Wing M Chen 9/1/92
Test Conductor Date

- 8.2.34 Verify that PULL HEAD DRIVE B M-107B does NOT contact the East end-of-travel hard stop when operating at 100% JOG SPEED.

Wing M Chen 9/1/92
Test Conductor Date

- 8.2.35 Obtain one still photograph of the Pull Head Drive near the East hard stop.

PHOTO: Roll 115 # 18

- 8.2.36 Note, for information only, using a tape measure, the clearance from the East hard stop.

EAST END-OF-TRAVEL CLEARANCE: 1 ¹⁵/₁₆

8.2.37 Record the Process Control System indications for East end-of-travel proximity switch actuation:

Green Jack indicator ok

Fault light ok

Message ok

8.2.38 After both ends of travel have been tested, note the JOG Mode speed limit setpoint for PULL HEAD DRIVE B M-107B.

PULL HEAD DRIVE B JOG SPEED SETPOINT: 5,000

8.2.39 Testing as per Section 8.2 is completed.

David M. Elmer 9/1/92
Test Conductor Date

8.2.40 Acceptance Criteria

- . The Process Control System indicates that the proximity sensors were actuated for both ends of travel for both pull head drives.
- . Hard stops were not contacted when, operating at 100% JOG SPEED, the proximity sensors were actuated for both ends of travel for both pull head drives.

David M. Elmer 9/1/92
Test Conductor Date
W. M. Hughes 11/1/92
QA Date

8.3 AUTO MODE SEQUENCE AND CCTV CAMERA TESTING

NOTE

Initial testing as per Section 8.1.6.1 for SINGLE mode operations and as per Section 8.1.6.2 for AUTO mode operations verified the operation of the sequence. However, CALL CAMERA operations were performed with Camera 4 and the coverage criteria were not fully demonstrated. Camera call operations are reprogrammed to provide adequate coverage. This test demonstrates operations with CCTV Camera 3 and 7 for the first two rod extraction hold points and with Cameras 4 and 8 for the rod-released hold point. Coverage criteria are revised to reflect function as per TAC Change Notice 001.

note: 2LW34
requires that
correct speed
references be
programmed
for testing.
N/A

- 8.3.1 Ensure that the Rod Extraction System has been restored following JOG Mode operations.
- 8.3.2 Ensure that the CCTV System is in service and set-up for this testing.
- 8.3.3 Simulate the presence of fuel as required to enable programmed mode operations. Place other interfacing systems in the required operating modes. Record such activities in the Daily Test Log.
- 8.3.4 Set up image sources for the Clamping Table's Upper and Lower Clamps. Such a set-up should represent W 17 X 17 rods.
- . At the lower clamps, arrange the image source to represent rods pulled approximately one inch. Triangular stacks of three 3/8" studs with the top stud off-set by one inch is recommended.
 - . At the upper clamp, arrange the full-length rod image source to represent rods not pulled. Place one test rod in each fuel assembly position but do not actuate the load-cells. Position it such that it cannot be gripped.
 - . Photograph the test setup.

PHOTO: N/A

NOTE

Operations in the SINGLE Mode are identical to AUTO mode operations with the exception that sequential servo-motor operations must be enabled. It is semi-automatic rather than automatic. Only SINGLE Mode operations are performed in this testing.

- 8.3.5 Position the Pull Head Drives A M-107A and B M-107B in the BACK position with all grippers open.

NOTE

Operate the Clamping Table as required to support this Pull Head Drive testing.

- 8.3.6 Place the Rod Extraction System in the SINGLE Mode.

Pull Head Drive Extension

NOTE

Monitor operations on the ROD EXTRACTION A control screen. The following timing should be based on control system indications.

- 8.3.7 Initiate the sequence. At the ^{note: continue with} EXTEND PULL HEADS operating message, start timing.

- 8.3.8 Observe that the Pull Head Drives M-107A and M-107B extend and that the gripper JAWS close. Stop timing. TRC 117
✓
9/10/92

- 8.3.9 Note the elapsed time: 2 min 7 sec

- 8.3.10 Photograph the extended pull heads.

PHOTO: N/A robot

- 8.3.11 Record, for information only, the pull head drive position indications.

PULL HEAD DRIVE A M-107A: .299 inches

PULL HEAD DRIVE B M-107B: .299 inches

- ~~8.3.12 Identify a "0" reference point for the use of collecting pull head drive extraction travel measurements.~~ N/A robot
✓ 9/10/92

Retest #37 9/17/76

Verify Pulling Operation Hold Point

- 8.3.13 Actuate **CONTINUE** and start timing.
- 8.3.14 **Observe** that the Pull Head Drives M-107A and M-107B **retract** to the first hold point position. Stop timing.
- 8.3.15 Note the elapsed time: 2.75 Sec
- 8.3.16 Observe that the **VERIFY PULLING OPERATION** Hold Point is presented. Start timing.
- 8.3.17 Actuate **ALARM ACK** on the Rod Extraction A Control Screen.
- 8.3.18 Actuate **CALL CAMERA** on the Rod Extraction A control screen.
- 8.3.19 Observe that CCTV Cameras 3 and 7 are displayed on the console monitors. Adjust as required to obtain image source display.
- 8.3.20 Simulate, but do not actuate, **CONTINUE** on the Rod Extraction A Control screen.
- 8.3.21 Stop timing, note the elapsed time: 12.74 Sec

NOTE

The first hold point is currently set at 1 inch. This can be increased up to 2 inches if required to get a better display. If the setpoint is adjusted, enter the appropriate entries in the Daily Test Log recording the new setpoint and perform a retest as per this section AND as per Section 8.1.2 of the original test procedure. Attach any retests as per this TPCN to this TPCN.

ATTACHMENT: _____
ATTACHMENT: _____

- 8.3.22 **Record**, for information only, the pull head drive **position** indications.

PULL HEAD DRIVE A M-107A: 1.44 inches

PULL HEAD DRIVE B M-107B: 1.463 inches

retest 21033 9/9/92

~~8.3.23 Record the extraction travel of the pull heads for information only using a tape measure.~~

PULL HEAD A TRAVEL TO 1st HOLD POINT: _____ inches

~~PULL HEAD B TRAVEL TO 1st HOLD POINT: _____ inches~~

8.3.24 Verify that the image source is displayed and that

- . The lower clamp image indicates that the rod is partially pulled.
- . The Upper Clamp image indicates that a rod has not been pulled.

Wesley M. Chapman 9/9/92
Test Conductor Date

~~8.3.25 Complete a CCTV Assessment Form, Appendix E.~~

ATTACHMENT: _____

8.3.26 Acceptance Criteria

- . Video images from Cameras No. 3 and 7 are displayed on the console monitors when CALL CAMERA is actuated at the VERIFY PULLING OPERATION Hold Point.
- . Both cameras can be positioned to verify the partial extraction of rods.

Wesley M. Chapman 9/9/92
Test Conductor Date

R. J. [Signature] 9/9/92
QA Date

Enter # of Rods Remaining Hold Point

- 8.3.27 Actuate CONTINUE and start timing.
- 8.3.28 Observe that the Pull Head Drives M-107A and M-107B retract to the second hold point position. Stop timing.

NOTE

The Hold Point alarm may be acknowledged now for convenience.

- 8.3.29 Note the elapsed time: 14.57 sec.

~~8.3.30 Did both drives start and stop at the same time?~~

- ~~8.3.31 Were drive operations smooth and continuous with speed acceleration at the start and speed deceleration at the end?~~

NOTE

This elapsed extraction time represents the initial time measurement for use in the evaluation of the extraction speed criteria. The extraction pull from the first hold point is expected to occur in ≤ 0.97 minutes at an average speed of ≥ 181 ipm. Due to acceleration and deceleration ramps, the actual extraction speed setpoint may have to be increased to meet the time criteria.

W.M.
11/23/92

- 8.3.32 Calculate the average Pull Head Drive speed (for information only) as

(175 inches)(60 sec/min)/(elapsed time)

$$\frac{(175)(60)}{1057} \approx 96 \text{ ipm}$$

- 8.3.33 Observe that the ENTER # OF RODS REMAINING IN ROW Hold Point is presented. Start timing.
- 8.3.34 Actuate ALARM ACK on the Rod Extraction A Control Screen.
- 8.3.35 Actuate CALL CAMERA on the Rod Extraction A control screen.
- 8.3.36 Observe that CCTV Cameras 3 and 7 are displayed on the console monitors. Adjust as required to obtain image source display. Look at the displays to see the test rods.
- 8.3.37 Enter "0" at the Rod Extraction A Control Screen's KEYBOARD INPUT.
- 8.3.38 Simulate, but do not actuate, CONTINUE on the Rod Extraction A control screen.
- 8.3.39 Stop timing, note the elapsed time: 21.07 Sec
- 8.3.40 Verify that the image source is displayed and that the full length test rod in each fuel assembly position is visible.

James M. Mch 9/1/92
Test Conductor Date

- 8.3.41 Record, for information only, the pull head drive position indications.

PULL HEAD DRIVE A M-107A: 176.318 inches

PULL HEAD DRIVE B M-107B: 176.318 inches

- ~~8.3.42 Record the extraction travel of the pull heads for information only using a tape measure.~~

~~PULL HEAD A TRAVEL TO 2nd HOLD POINT: _____ inches~~

~~PULL HEAD B TRAVEL TO 2nd HOLD POINT: _____ inches~~

- 8.3.43 Complete a CCTV Assessment Form, Appendix E.

ATTACHMENT: _____

min
notes
9/1/92

Revised 12/83 9/94

8.3.44 Acceptance Criteria

- . Video images from Cameras No. 3 and 7 are displayed on the console monitors when CALL CAMERA is actuated at the ENTER # OF RODS REMAINING Hold Point.
- . Both cameras can be positioned to verify that all rods in the row were extracted or to count the number of rods remaining in the row.

James M. Chen 7/9/92
Test Conductor Date

W. H. Greer 9/9/92
QA Date

Verify Pulling Clear Hold Point

NOTE

The following timing should be based on control system indications.

- 8.3.45 Actuate **CONTINUE** and start timing.
- 8.3.46 Observe that the Pull Head Drives M-107A and M-107B retract to the drop rods position and that the gripper **JAWS** open. Stop timing.
- 8.3.47 Note the elapsed time: 10.15 Sec retract only
Estimated gripper closing time 36.5 sec - see test log 9/9/92

NOTE

The actuation of the **OFF** mode below is to represent the actuation of **CONTINUE** in the normal process.

- 8.3.48 Observe that the **VERIFY PULLING CLEAR** Hold Point is presented. Start timing.
- 8.3.49 Actuate **ALARM ACK** on the Rod Extraction A Control Screen.
- 8.3.50 Actuate **CALL CAMERA** on the Rod Extraction A control screen.
- 8.3.51 Observe that CCTV Cameras 4 and 8 are displayed on the console monitors. Look at Camera 8's display to see if any rods are there.
- 8.3.52 Actuate the **OFF** Mode on the Rod Extraction A control screen.
- 8.3.53 Stop timing, note the elapsed time: 9.465 sec
- 8.3.54 Complete CCTV Assessment Forms, Appendix E for Cameras 4 and 8.

ATTACHMENT: 10/11

- 8.3.55 Record, for information only, the pull head drive position indications.

PULL HEAD DRIVE A M-107A: 180.391 inches

PULL HEAD DRIVE B M-107B: 180.391 inches

Relat NCR 9/9/92

~~8.3.56 Record the extraction travel of the pull heads for information only using a tape measure.~~

~~PULL HEAD A TRAVEL TO 3rd HOLD POINT: _____ inches~~

~~PULL HEAD B TRAVEL TO 3rd HOLD POINT: _____ inches~~

via test
9/9/92

8.3.57 Acceptance Criteria

- Video images from Cameras No. 4 and 8 are displayed on the console monitors when CALL CAMERA is actuated at the VERIFY PULLING CLEAR Hold Point.
- Camera 8 provides a view of the jaw/fuel rod interface sufficient to determine that all rods are released.

David M. Chan 9/9/92
Test Conductor Date
W. Mulgrew 9/9/92
QA Date

NOTE

The following evaluates whether or not the RBT's cameras 9 and 10 are useful to evaluate rod release from the grippers.

8.3.58 Operating the RBT in the JOG Mode, position it such that CCTV Cameras 9 and 10 can be used, in conjunction with stationary CCTV Camera 4 to investigate if it can verify that all rods are released from the grippers.

8.3.59 Complete a CCTV Assessment Form, Appendix E.

ATTACHMENT: 12†13

8.4 SEQUENCE TIMING AND DRIVE SPEEDS**NOTE**

This section must be performed after the final first hold point distance is verified.

8.4.1 Summarize the observed operating times from Section 8.3 above for unloaded operations:

. Time for Pull Head Drive extension and gripper closure:	<u>127 Sec</u>
. Time to get to the first hold point:	<u>875 Sec</u>
. Time in first hold point:	<u>12.74 Sec</u>
. Time to get to second hold point:	<u>109.57 Sec</u>
. Time in second hold point:	<u>21.02 Sec</u>
. Time to get to third hold point:	<u>78.3 Sec</u> <u>10.15 Sec</u>
. Time in third hold point:	<u>9.46 Sec</u>

Total ~ 335 Sec

8.4.2 Evaluate the recorded data in comparison to the following estimates as made in the time study analysis calculation and revised for different travel distances. Note any observations.

<u>Motion</u>	<u>Min</u>	<u>Sec</u>
Move pull head drives West:	0.99	59.7
Close gripper heads	0.21	12.6
Extraction to first hold point:	0.01	0.6
Verify first hold point:	0.50	30.0
Extraction to second hold point:	0.97	58.2
Verify second hold point:	0.50	30.0
To retract to third hold point:	0.02	1.2
To open grippers:	0.21	12.6
To verify third hold point:	0.50	30.0
TOTAL	3.95 ¹	234.9

31/1/91

8.4.2 Continued

Observations

1. The 30 seconds allocated for the three hold points can be accomplished by a trained operator if the cameras are correctly oriented. This will probably be the case in normal operations after the first reel is pulled. Camera movements can add significant delays if they are not correctly positioned.
2. The estimated time for machine operations $(224.9 - 90) = 134.9$ seconds does not compare favorably to the $(127 + 22.75 + 109.57 + 36.5 + 14.11) = 292$ seconds measured. It takes twice as long to do the operations as was estimated in the calculation. Gripper operation, time is limited by process control system response. Pull Head Drive speed would have to be more than doubled to obtain times comparable to the estimate. This is not practical given the current motor selection. It may also induce mechanical problems. Finally, it may have an adverse impact on pulling force peakings.
3. Total time required was ~335 sec compared to estimated ~295 sec.

~~8.4.3 BRANCH~~

- ~~IF the extraction time between the first and second hold points is > 58.2 seconds (.97 minutes),~~
- ~~THEN GO TO Step 8.4.4.~~
- ~~OTHERWISE, GO TO Step 8.4.8~~

Evaluate Pull Head Drive Speed Increase

~~8.4.4 Adjust motor speed, acceleration, deceleration, or other motor parameters as per the AEG 3240 System Design and Installation manual to obtain best available speed without other complications or to obtain the required extraction time, whichever is the lesser. Perform testing to verify that the setpoints do not result in abnormal drive operations. Record activities in the daily test log.~~

~~8.4.5 WHEN the criteria is met OR WHEN the best available speed is obtained, THEN obtain printout of motor parameters and attach it to this TPCN.~~

~~ATTACHMENT: _____~~

~~8.4.6 Record the final extraction time between the first and second hold points.~~

~~FINAL EXTRACTION TIME: _____~~

8.4.7 ~~Using a clean copy of this TPCN, re-perform the single mode sequence testing of Section 8.3 to obtain updated time values and complete Steps 8.4.1 and 8.4.2. Do not re-perform camera coverage verifications. Attach this retest to this TPCN.~~

ATTACHMENT: _____

NOTE

A DCN is required to implement and document the revised setpoints.

8.4.8

Acceptance Criteria

_____. Rod Extraction between the second and third hold points takes ≤ 0.97 minutes with an average speed of ≥ 181 inches per minute.

OR

✓. Best available time has been obtained.

see Q425.

<u>David M. Chen</u>	<u>9/10/92</u>
Test Conductor	Date
<u>R. M. G. [Signature]</u>	<u>9/10/92</u>
QA	Date

8.4.9

Evaluate the collected operating time data against the time study analysis calculation to determine if the actual extraction times will be critical path while fuel assembly preparation is occurring. It is expected that fuel preparation times will remain the critical path. Record observations:

The observed time to extract rods was ~725 seconds. The estimated time was ~215 seconds. Assuming no other impacts, the allocated time for extraction of 17 rods is increased from 105.12 min. to 132.44 minutes. The time study analysis used 65.9 minutes for cutting, 2.5 minutes for transfer from storage, and 2.8 minutes for transfer to Chopping Table. This totals 146.4 minutes for two assemblies. Rod extraction time of 132.44 minutes + two skeleton moves (2.8 x 2) + transfer plus one move from end storage table 2.8 totals 147.84. The cutting system remains the critical path based on available time estimates.

RGTEST FORZ QCHZ1 9/19/92

8.5

ROD PULLING FORCE COMPARISON

NOTE

In this section, rod pulling forces will be measured using a force gauge and this data will be compared with the data recorded by the pull force load cells. There are four pulling force load cells in each W 17 X 17 pull head which sample the pulling forces for the grippers. This testing will be performed for a test rod in alignment with each load cell.

- 8.5.1 Place the Rod Extraction System in the JOG Mode.
- 8.5.2 Open all gripper JAWS.
- 8.5.3 Position the Clamping Table as required to support this testing.
- 8.5.4 Retract PULL HEAD DRIVE B M-107B toward the East end-of-travel for clearance.
- 8.5.5 Extend PULL HEAD DRIVE A M-107A towards the West end-of-travel for convenience of test set-up.
- 8.5.6 Record the initial gripper-OPEN FORCE indications for Pull Head Drive A M-107A.

JAW 1-A M-107C FORCE: _____ lbs

JAW 1-B M-107D FORCE: _____ lbs

JAW 1-C M-107E FORCE: _____ lbs

JAW 1-D M-107F FORCE: _____ lbs

*Note This section is not
re-performed.
See QCHZ1
9/19/92*

Pull Head Drive A Northernmost Pulling Force Load Cell

8.5.7 Insert the test rod and force gauge in alignment with the northernmost pull head drive load cell for a nominal 1/2 inch grip.

8.5.8 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.

8.5.9 Close the gripper JAWS for PULL HEAD DRIVE A M-107A.

8.5.10 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive A M-107A.

JAW 1-A M-107C FORCE: _____ lbs

JAW 2-A M-107D FORCE: _____ lbs

JAW 3-A M-107E FORCE: _____ lbs

JAW 4-A M-107F FORCE: _____ lbs

8.5.11 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: _____

Type of Measuring Device: FORCE GAUGE Range: _____

ID Number: _____ Calibration Due Date: _____

8.5.12 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, retract the drive until a force of ~~140~~ ¹⁰⁰ to 200 lbs is indicated on the force gauge.

8.5.13 Record the loaded Force Gauge indication:

FORCE GAUGE LOAD INDICATION: _____

8.5.14 Record the extraction **FORCE** indications for Pull Head Drive A M-107A.

JAW 1-A M-107C FORCE: _____ lbs

JAW 2-A M-107D FORCE: _____ lbs

JAW 3-A M-107E FORCE: _____ lbs

JAW 4-A M-107F FORCE: _____ lbs

8.5.15 Take a photograph of the test set-up under load.

PHOTO: _____

- 8.5.16 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.17 Open the PULL HEAD DRIVE A M-107A gripper JAWS.
- 8.5.18 Remove the test rod and force gauge from the pull head gripper jaws.

Pull Head Drive A North-Center Pulling Force Load Cell

- 8.5.19 Insert the test rod and force gauge in alignment with the north-center pull head drive load cell for a nominal 1/2 inch grip.
- 8.5.20 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.
- 8.5.21 Close the gripper JAWS for PULL HEAD DRIVE A M-107A.
- 8.5.22 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive A M-107A.

JAW 1-A M-107C FORCE: _____ lbs

JAW 2-A M-107D FORCE: _____ lbs

JAW 3-A M-107E FORCE: _____ lbs

JAW 4-A M-107F FORCE: _____ lbs

- 8.5.23 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: _____

Type of Measuring Device: FORCE GAUGE Range: _____

ID Number: _____ Calibration Due Date: _____

- 8.5.24 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, retract the drive until a force of ~~140~~₁₀₀ to 200 lbs is indicated on the force gauge. 100
9/1/82

- 8.5.25 Record the loaded Force Gauge indication:

FORCE GAUGE LOAD INDICATION: _____

- 8.5.26 Record the extraction **FORCE** indications for Pull Head Drive A M-107A.

JAW 1-A M-107C FORCE: _____ lbs

JAW 2-A M-107D FORCE: _____ lbs

JAW 3-A M-107E FORCE: _____ lbs

JAW 4-A M-107F FORCE: _____ lbs

- 8.5.27 Take a photograph of the test set-up under load.

PHOTO: _____

- 8.5.28 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.29 Open the PULL HEAD DRIVE A M-107A gripper JAWS.
- 8.5.30 Remove the test rod and force gauge from the pull head gripper jaws.

Pull Head Drive A South-Center Pulling Force Load Cell

- 8.5.31 Insert the test rod and force gauge in alignment with the South-center pull head drive load cell for a nominal 1/2 inch grip.
- 8.5.32 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.
- 8.5.33 Close the gripper JAWS for PULL HEAD DRIVE A M-107A.
- 8.5.34 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive A M-107A.
- JAW 1-A M-107C FORCE: _____ lbs
- JAW 2-A M-107D FORCE: _____ lbs
- JAW 3-A M-107E FORCE: _____ lbs
- JAW 4-A M-107F FORCE: _____ lbs
- 8.5.35 Record the initial Force Gauge indication:
- FORCE GAUGE NO-LOAD INDICATION: _____
Type of Measuring Device: FORCE GAUGE Range: _____
ID Number: _____ Calibration Due Date: _____
- 8.5.36 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, retract the drive until a force of ~~140~~₁₀₀ to 200 lbs is indicated on the force gauge. TPCN 7
9/1/82
- 8.5.37 Record the loaded Force Gauge indication:
- FORCE GAUGE LOAD INDICATION: _____
- 8.5.38 Record the extraction **FORCE** indications for Pull Head Drive A M-107A.
- JAW 1-A M-107C FORCE: _____ lbs
- JAW 2-A M-107D FORCE: _____ lbs
- JAW 3-A M-107E FORCE: _____ lbs
- JAW 4-A M-107F FORCE: _____ lbs
- 8.5.39 Take a photograph of the test set-up under load.

PHOTO: _____

- 8.5.40 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.41 Open the PULL HEAD DRIVE A M-107A gripper JAWS.
- 8.5.42 Remove the test rod and force gauge from the pull head gripper jaws.

Pull Head Drive A Southernmost Pulling Force Load Cell

- 8.5.43 Insert the test rod and force gauge in alignment with the southernmost pull head drive load cell for a nominal 1/2 inch grip.
- 8.5.44 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.
- 8.5.45 Close the gripper JAWS for PULL HEAD DRIVE A M-107A.
- 8.5.46 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive A M-107A.

JAW 1-A M-107C FORCE: _____ lbs

JAW 2-A M-107D FORCE: _____ lbs

JAW 3-A M-107E FORCE: _____ lbs

JAW 4-A M-107F FORCE: _____ lbs

- 8.5.47 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: _____

Type of Measuring Device: FORCE GAUGE Range: _____

ID Number: _____ Calibration Due Date: _____

- 8.5.48 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, retract the drive until a force of ¹⁴⁰₁₀₀ to 200 lbs is indicated on the force gauge. TPCN 4
9/11/12

- 8.5.49 Record the loaded Force Gauge indication:

FORCE GAUGE LOAD INDICATION: _____

- 8.5.50 Record the extraction **FORCE** indications for Pull Head Drive A M-107A.

JAW 1-A M-107C FORCE: _____ lbs

JAW 2-A M-107D FORCE: _____ lbs

JAW 3-A M-107E FORCE: _____ lbs

JAW 4-A M-107F FORCE: _____ lbs

- 8.5.51 Take a photograph of the test set-up under load.

PHOTO: _____

- 8.5.52 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.53 Open the PULL HEAD DRIVE A M-107A gripper JAWS.
- 8.5.54 Remove the test rod and force gauge from the pull head gripper jaws.

Revised 9/4/92

Pull Head Drive B M-107B

- 8.5.55 Retract PULL HEAD DRIVE A M-107A toward the East end-of-travel for clearance.
- 8.5.56 Extend PULL HEAD DRIVE B M-107B towards the West end-of-travel for convenience of test set-up.
- 8.5.57 Record the initial gripper-OPEN **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: _____ lbs

JAW 2-B M-107H FORCE: _____ lbs

JAW 3-B M-107I FORCE: _____ lbs

JAW 4-B M-107J FORCE: _____ lbs

Revised 9/4/92

Pull Head Drive B Northernmost Pulling Force Load Cell

- 8.5.58 Insert the test rod and force gauge in alignment with the northernmost pull head drive load cell for a nominal 1/2 inch grip.
- 8.5.59 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.
- 8.5.60 Close the gripper JAWS for PULL HEAD DRIVE B M-107B.
- 8.5.61 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive B M-107B.
- JAW 1-B M-107G FORCE: _____ lbs
- JAW 2-B M-107H FORCE: _____ lbs
- JAW 3-B M-107I FORCE: _____ lbs
- JAW 4-B M-107J FORCE: _____ lbs
- 8.5.62 Record the initial Force Gauge indication:
- FORCE GAUGE NO-LOAD INDICATION: _____
Type of Measuring Device: FORCE GAUGE Range: _____
ID Number: _____ Calibration Due Date: _____
- 8.5.63 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, retract the drive until a force of ~~140~~₁₀₀ to 200 lbs is indicated on the force gauge. 7
9/4/92
- 8.5.64 Record the loaded Force Gauge indication:
- FORCE GAUGE LOAD INDICATION: _____
- 8.5.65 Record the extraction **FORCE** indications for Pull Head Drive B M-107B.
- JAW 1-B M-107G FORCE: _____ lbs
- JAW 2-B M-107H FORCE: _____ lbs
- JAW 3-B M-107I FORCE: _____ lbs
- JAW 4-B M-107J FORCE: _____ lbs
- 8.5.66 Take a photograph of the test set-up under load.
- PHOTO: _____

Revised 9/4/92

- 8.5.67 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.68 Open the PULL HEAD DRIVE B M-107B gripper JAWS.
- 8.5.69 Remove the test rod and force gauge from the pull head gripper jaws.

Relax 9/4/92

Pull Head Drive B North-Center Pulling Force Load Cell

- 8.5.70 Insert the test rod and force gauge in alignment with the north-center pull head drive load cell for a nominal 1/2 inch grip.
- 8.5.71 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.
- 8.5.72 Close the gripper JAWS for PULL HEAD DRIVE B M-107B.
- 8.5.73 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: _____ lbs

JAW 2-B M-107H FORCE: _____ lbs

JAW 3-B M-107I FORCE: _____ lbs

JAW 4-B M-107J FORCE: _____ lbs

- 8.5.74 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: _____

Type of Measuring Device: FORCE GAUGE Range: _____

ID Number: _____ Calibration Due Date: _____

- 8.5.75 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, retract the drive until a force of ~~140~~¹⁰⁰ to 200 lbs is indicated on the force gauge. REV 7
9/4/92

- 8.5.76 Record the loaded Force Gauge indication:

FORCE GAUGE LOAD INDICATION: _____

- 8.5.77 Record the extraction **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: _____ lbs

JAW 2-B M-107H FORCE: _____ lbs

JAW 3-B M-107I FORCE: _____ lbs

JAW 4-B M-107J FORCE: _____ lbs

- 8.5.78 Take a photograph of the test set-up under load.

PHOTO: _____

Revised 9/4/92

- 8.5.79 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.80 Open the PULL HEAD DRIVE B M-107B gripper JAWS.
- 8.5.81 Remove the test rod and force gauge from the pull head gripper jaws.

Revised 9/1/92

Pull Head Drive B South-Center Pulling Force Load Cell

- 8.5.82 Insert the test rod and force gauge in alignment with the South-center pull head drive load cell for a nominal 1/2 inch grip.
- 8.5.83 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.
- 8.5.84 Close the gripper JAWS for PULL HEAD DRIVE B M-107B.
- 8.5.85 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: _____ lbs

JAW 2-B M-107H FORCE: _____ lbs

JAW 3-B M-107I FORCE: _____ lbs

JAW 4-B M-107J FORCE: _____ lbs

- 8.5.86 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: _____

Type of Measuring Device: FORCE GAUGE Range: _____

ID Number: _____ Calibration Due Date: _____

- 8.5.87 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, retract the drive until a force of ~~140~~¹⁰⁰ to 200 lbs is indicated on the force gauge. TRCN 7
9/1/92

- 8.5.88 Record the loaded Force Gauge indication:

FORCE GAUGE LOAD INDICATION: _____

- 8.5.89 Record the extraction **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: _____ lbs

JAW 2-B M-107H FORCE: _____ lbs

JAW 3-B M-107I FORCE: _____ lbs

JAW 4-B M-107J FORCE: _____ lbs

- 8.5.90 Take a photograph of the test set-up under load.

PHOTO: _____

Revised 9/4/92

- 8.5.91 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.92 Open the PULL HEAD DRIVE B M-107B gripper JAWS.
- 8.5.93 Remove the test rod and force gauge from the pull head gripper jaws.

Revised 9/4/92

Pull Head Drive B Southernmost Pulling Force Load Cell

- 8.5.94 Insert the test rod and force gauge in alignment with the Southernmost pull head drive load cell for a nominal 1/2 inch grip.
- 8.5.95 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.
- 8.5.96 Close the gripper JAWS for PULL HEAD DRIVE B M-107B.
- 8.5.97 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: _____ lbs

JAW 2-B M-107H FORCE: _____ lbs

JAW 3-B M-107I FORCE: _____ lbs

JAW 4-B M-107J FORCE: _____ lbs

- 8.5.98 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: _____

Type of Measuring Device: FORCE GAUGE Range: _____

ID Number: _____ Calibration Due Date: _____

- 8.5.99 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, retract the drive until a force of ~~140~~¹⁰⁰ to 200 lbs is indicated on the force gauge. TPCN 7
9/4/92

- 8.5.100 Record the loaded Force Gauge indication:

FORCE GAUGE LOAD INDICATION: _____

- 8.5.101 Record the extraction **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: _____ lbs

JAW 2-B M-107H FORCE: _____ lbs

JAW 3-B M-107I FORCE: _____ lbs

JAW 4-B M-107J FORCE: _____ lbs

- 8.5.102 Take a photograph of the test set-up under load.

PHOTO: _____

Revised 9/4/92

- 8.5.103 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.104 Open the PULL HEAD DRIVE B M-107B gripper JAWS.
- 8.5.105 Remove the test rod and force gauge from the pull head gripper jaws.

Closure

- 8.5.106 Position PULL HEAD DRIVE A M-107A between proximity sensors.
- 8.5.107 Position PULL HEAD DRIVE B M-107B between proximity sensors.
- 8.5.108 Place the Rod Extraction System in the OFF Mode, then perform the RESTORE process.
- 8.5.109 Compare the obtained sets of pull force data.
- . Develop best fit straight line curves to relate the indicated pulling forces to the measured pulling forces. Attach the graph to this TPCN.

ATTACHMENT: _____

- . If the lines are not reasonably parallel or if they differ in excess of 5% (referencing the measured value), then prepare a conversion factor for use in integrated system testing.

CONVERSION FACTOR: _____

- . Evaluate the test results.

NOTE

Pulling force is not a critical measurement for normal operations. The data is captured for trend analysis and for evaluation of off-normal events. "Constant" is understood to be that there is a limited difference between indications or that a conversion factor is developed.

8.5.110 Acceptance Criteria

The differences between the pull forces measured at the test fixture and the pull force recorded from the pullhead load cell are constant.

Test Conductor Date

QA Date

8.6

PULLING FORCE/INSERTION LENGTH DEMONSTRATION**NOTE**

Daily test log entries indicate that rod pulling forces exceed the maximum of 200 lbs when rods are inserted greater than 1/2 inch into the grippers. The 1/2 inch insertion is the design value but up to 3/4 inch can be accommodated. The pulling force acceptance criteria was demonstrated at the design insertion value.

However, the grippers must accommodate up to 1.5 inch off-set for two inches of insertion. The exact insertion data was not recorded in previous testing. The deviant rods may have been bottomed-out at 2.5 inches. This section seeks to check the pulling forces at the revised bottomed-out insertion length of two inches (1/2 inch + 1.5 inch off-set) to demonstrate this criteria for off-set rods or to obtain data for Phase IV evaluation.

The acceptance criteria of a maximum of 200 pounds is retained as in the TAC. However, this testing shall seek to determine that the worst case conditions do not exceed 500 lbs. A calculation was previously performed which indicated that 1000 lbs would be required to break a thinned rod. For the purposes of testing, 500 lbs will be an administrative limit for operating with this exception.

This testing is performed for all grippers being loaded since the recovery of a single rod may effectively be performed in the JOG mode rather than the existing programmed option mode. Pull Head M-107A's fifth gripper from the left as facing East is selected as the worst case gripper having achieved a 195 lb pull force in the second cycle of initial testing.

- 8.6.1 Place the Rod Extraction System in the JOG Mode.
- 8.6.2 Retract Pull Head Drive B M-107B to a midpoint position.
- 8.6.3 Extend Pull Head Drive A M-107A to an accessible position.

- 8.6.4 Position the Clamping Table elevation as required for testing.
- 3.6.5 Set Rod Extraction System JOG SPEED to a minimum value.
- 8.6.6 Insert the test rod with a ≥ 500 lb force gauge (or equivalent) in the fifth-from-left gripper position on Pull Head A for a nominal 2 inch bottomed-out grip.
- 8.6.7 Insert 16 dummy test rods in the remaining gripper positions for Pull Head A for a nominal 1/2 inch grip.
- 8.6.8 Close the gripper JAWS for PULL HEAD DRIVE A M-107A.
- 8.6.9 Record the initial Force Gauge indication.

NO LOAD FORCE: Ø

Type of Measuring Device: <u>Force Gauge</u>	Range: <u>±200#</u>
<i>Dillon</i>	
ID Number: <u>X 92274</u>	Calibration Due Date: _____

- 8.6.10 Photograph the test set-up.
- PHOTO: roll 15 #13
- 8.6.11 Operating PULL HEAD DRIVE A M-107A slowly in the JOG Mode, retract the drive UNTIL

- . a net force increase of up to 500 lbs is indicated on the force gauge

OR

- . the test rod slips.

- 8.6.12 Record the peak Force Gauge indication(s).

PEAK FORCE: 140 lbs indicated ~140 lbs actual

- 8.6.13 Note if the test rod slips.

✓ ROD SLIPPED AT ≤ 500 LBS

OR

 PULLING FORCE REACHED 500 LBS

- 8.6.14 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.

- 8.6.15 Repeat as necessary to obtain data. If required by forces of ≥ 500 lbs, collect data for an insertion length limit for use in integrated system testing.

____ IST OFF-SET LIMITED TO: _____

OR

☒ OFF-SET NOT LIMITED FOR IST

- 8.6.16 Open the PULL HEAD DRIVE A M-107A gripper JAWS.
- 8.6.17 Remove the test rod and force gauge from the pull head gripper jaws.
- 8.6.18 Place the Rod Extraction System in the OFF Mode, THEN perform the Restore process.
- 8.6.19 Acceptance Criteria

☒ Test rod slippage was observed at pulling forces of ≤ 200 lbs at the bottomed-out insertion length

OR

____ An Exception/Repair Log entry is prepared for Phase IV disposition,

RL No. _____

AND

____ pulling force was less than 500 lbs before slippage,

OR

____ IST offset limit is determined.

<u>W. M. Cheame</u>	<u>9/8/92</u>
Test Conductor	Date
<u>Peta V. Gould</u>	<u>9/8/92</u>
QA	Date

NOTE

The integrated system test for normal operations should be performed using any off-set limitation as determined by this testing.

8.7 ROD PULLING DEMONSTRATIONS

NOTE

This section addresses verifications of rod gripping, simulated extraction, and rod release for off-set rods and bowed rods using the gripper inserts which limit gripper insertion to 1.5 inches.

8.7.1 Place the Rod Extraction System in the HAND Mode.

Pull Head Drive A M-107A

8.7.2 Operating PULL HEAD DRIVE A M-107A in the HAND Mode with grippers open, position the drive at the VERIFY PULLING CLEAR Hold Point position.

8.7.3 Place the Clamping Table at a setpoint elevation suitable for testing.

8.7.4 Place 17 test rods on the Clamping Table in alignment with Pull Head Drive A such that:

- the East end of the rods are aligned (North/South) 15/16 to 1-1/16 inch ~~West~~ of the East end of the top of the Clamping Table, ^{TPCN 9} ~~West~~ 9/14/92
- the rods are in vertical and horizontal alignment with the Pull Head Drive A grippers, and
- the rods are reasonably restrained from free motion to prevent travel west from any contact friction with horizontal jaw surfaces.

8.7.5 Operating PULL HEAD DRIVE A M-107A ~~in the HAND Mode~~ with grippers open, extend the drive to the grip rods position. ^{TPCN 10} 9/14/92

NOTE

The Pull Head Drive grip-rods setpoint is expected to overlap by 1/2 inch with the rods positioned at 1 inch ~~West~~ of the East end of the top of the Clamping Table. ^{TPCN 9} 9/14/92

26438
9/14/92
8.7.6 Verify that the insertion of the test rods into the open grippers is 3/8 to 5/8 inches.

0.7263"

John M. Chapman 9/9/92
Test Conductor Date

- 8.7.7 Retract PULL HEAD DRIVE A M-107A to the VERIFY PULLING CLEAR Hold Point position.
- 8.7.8 Position any two of these rods to extend 1.4 to 1.5 inches East from the others. These rods are not expected to move when gripped.
- 8.7.9 Position any two additional rods to extend nominally 2 inches East from the aligned rods. These rods are expected to move slightly West when the pull head is extended because they will bottom-out in the jaws.
- 8.7.10 Position any two additional rods to represent a 1.5 inch bow at the center of the rods and a 1.4 to 1.5 inch offset. The bow should be oriented up so as to tend to lower the gripped end slightly.
- 8.7.11 Establish a reference point at the West end of the extended rods and note the initial distance with a tape measure.

	Initial Distance	Final Distance	Travel	
#13 1.5 inch rod 1:	1.5"		3/4"	RLB40W-919/91
#15 1.5 inch rod 2:	1.5"		3/4"	RLB40W-919/92
#9 2.0 inch rod 3:	1 13/16"		1 1/16"	RLB40W-919/92
#11 2.0 inch rod 4:	1 13/16"		1 1/16"	RLB40W-919/92
#16 Bowed rod 1:	1 1/2"		3/4"	RLB40W-919/92
#17 Bowed rod 2:	1 1/2"		3/4"	RLB40W-919/92

- 8.7.12 Photograph the test rod alignment.

PHOTO: 2011-09-10

- 8.7.13 Extend PULL HEAD DRIVE A M-107A ~~in the HAND Mode~~ to the grip-rods position. TPCN 10
9/19/92
- 8.7.14 Observe, ^{or observe} that all seventeen test rods are inserted into the jaws. TPCN 11
9/19/92
- 8.7.15 Close Pull Head A JAWS 1-A, 2-A, 3-A, and 4-A.
- 8.7.16 Observe that the gripper JAWS grip all seventeen test rods.
- 8.7.17 Observe that the non-off-set rods remain in position.

8.7.18 Obtain a still photograph of the gripped rods.

PHOTO: PULL IS
we

8.7.19 Note the final distance for the off-set rods from the reference line with a tape measure. Calculate the resulting travel. Record any observations in the Daily Test Log.

8.7.20 Acceptance Criteria

Pull Head Drive A M-107A grippers can accommodate a maximum 1.5 inch (extended) offset of the ends of the fuel rods and up to a 1.5 inch bow.

See Exceptions

<u>James M. Brown</u>	<u>9/10/92</u>
Test Conductor	Date
<u>W. S. [Signature]</u>	<u>9/10/92</u>
QA	Date

8.7.21 Remove any restrictions from the test rods for completion of the extraction cycle.

8.7.22 Open the pull head gripper JAWS.

8.7.23 Manually insert each rod to the bottomed-out position.

8.7.24 Close the pull head gripper JAWS.

NOTE

Monitor the rod release locally for observations.

8.7.25 Operating PULL HEAD DRIVE A M-107A in the HAND Mode, retract the drive to the second hold point position.

8.7.26 Open Pull Head A JAWS 1-A, 2-A, 3-A, and 4-A.

8.7.27 Operating PULL HEAD DRIVE A M-107A in the HAND Mode, retract the drive to the full retracted position.

8.7.28 Record observations related to the release of the rods.

Rods #12 & #14 failed to drop. They remained oriented about 1 1/4" and were manually pulled free to drop. Friction was sufficient to hold these rods in place. It is noted that the rods were oiled (probably to reduce rusting).

8.7.29 Verify that all test rods have dropped from the grippers.

Rods 12 & 14 failed to drop.

Angel M. Chen
Test Conductor

9/9/92
Date

8.7.30 Recover the test rods for re-use.

Pull Head Drive B M-107B

8.7.31 Operating PULL HEAD DRIVE B M-107B in the HAND Mode with grippers open, position the drive at the VERIFY PULLING CLEAR Hold Point position.

8.7.32 Place the Clamping Table at a setpoint elevation suitable for testing.

8.7.33 Place 17 test rods on the Clamping Table in alignment with Pull Head Drive B such that:

- . the East end of the rods are aligned (North/South) 15/16 to 1-1/16 inch ~~West~~ ^{East} of the East end of the top of the Clamping Table, TPCN 9
9/4/92
- . the rods are in vertical and horizontal alignment with the Pull Head Drive A grippers, and
- . the rods are reasonably restrained from free motion to prevent travel west from any contact friction with horizontal jaw surfaces.

8.7.34 Operating PULL HEAD DRIVE B M-107B ~~in the HAND Mode~~ with grippers open, extend the drive to the grip rods position. TPCN 10
9/4/92

NOTE

The Pull Head Drive grip-rods setpoint is expected to overlap by 1/2 inch with the rods positioned at 1 inch West of the East end of the top of the Clamping Table.

8.7.35 Verify that the insertion of the test rods into the open grippers is 3/8 to 5/8 inches. 0.7265"

Daniel M. Chen 9/9/92
Test Conductor Date

8.7.36 Retract PULL HEAD DRIVE B M-107B to the VERIFY PULLING CLEAR Hold Point position.

8.7.37 Position any two of these rods to extend 1.4 to 1.5 inches East from the others. These rods are not expected to move when gripped.

8.7.38 Position any two additional rods to extend nominally 2 inches East from the aligned rods. These rods are expected to move slightly West when the pull head is extended because they will bottom-out in the jaws.

8.7.39 Position any two additional rods to represent a 1.5 inch bow at the center of the rods and a 1.4 to 1.5 inch offset. The bow should be oriented up so as to tend to lower the gripped end slightly.

8.7.40 Establish a reference point at the West end of the extended rods and note the initial distance with a tape measure.

		Initial Distance	Final Distance	Travel	
#3	1.5 inch rod 1:	1.5"		9/16"	RLH 40 - 9/16/92
#4	1.5 inch rod 2:	1.5"		9/16"	RLH 40 - 9/16/92
#9	2.0 inch rod 3:	1 5/16"		1 1/4"	RLH 40 - 9/16/92
#11	2.0 inch rod 4:	1 7/8"		1 1/4"	RLH 40 - 9/16/92
#1	Bowed rod 1:	1 1/2"		9/16"	RLH 40 - 9/16/92
#2	Bowed rod 2:	1 1/2"		9/16"	RLH 40 - 9/16/92

8.7.41 Photograph the test rod alignment.

PHOTO: 9/15/92

8.7.42 Extend PULL HEAD DRIVE B M-107B ~~in the HAND Mode~~ to the grip-rods position. TPCN 10
9/19/92

39 8.7.43 Observe, ^{ensure} that all seventeen test rods are inserted into the jaws. TPCN 11
9/19/92

8.7.44 Close Pull Head B JAWS 1-B, 2-B, 3-B, and 4-B.

8.7.45 Observe that the gripper JAWS grip all seventeen test rods.

8.7.46 Observe that the non-off-set rods remain in position.

8.7.47 Obtain a still photograph of the gripped rods.

PHOTO: 9/15/92

8.7.48 Note the final distance for the off-set rods from the reference line with a tape measure. Calculate the resulting travel. Record any observations in the Daily Test Log.

8.7.49 Acceptance Criteria

Pull Head Drive B M-107B grippers can accommodate a maximum 1.5 inch (extended) offset of the ends of the fuel rods and up to a 1.5 inch bow.

See Exceptions

David M. Chapman 9/10/92
Test Conductor Date

W. M. Fulginiti 9/10/92
QA Date

- 8.7.50 Remove any restrictions from the test rods for completion of the extraction cycle.

NOTE

Monitor the rod release locally for observations.

- 8.7.51 Operating PULL HEAD DRIVE B M-107B in the HAND Mode, retract the drive to the second hold point position.

- 8.7.52 Open Pull Head B JAWS 1-B, 2-B, 3-B, and 4-B.

- 8.7.53 Operating PULL HEAD DRIVE B M-107B in the HAND Mode, retract the drive to the full retracted position.

- 8.7.54 Record observations related to the release of the rods.

All rods dropped sequentially as expected

- 8.7.55 Verify that all test rods have dropped from the grippers.

David M. Chapman 9/9/92
Test Conductor Date

8.8 CLOSURE

- 8.8.1 Take photographs of the installed gripper inserts used for testing.

PHOTO: Rolls # 7

- 8.8.2 Recover the test rods, remove the test equipment, and return the system to normal.
- 8.8.3 Operating CCTV Cameras 4 and 7, perform a CCTV assessment as per the original test procedure's Section 8.1.8, Servo Drive Fault Test. A fault condition in sequence is NOT required.

ATTACHMENT: 14-15

- 8.8.4 Verify that DCNs are issued as required to document setpoints revised as per this and as per previous testing. *All issues identified in testing are documented.*

W. M. Chapman 9/25/92
Test Conductor Date

- 8.8.5 Obtain and attach a printout of the final pull head drive and gripper and motor parameters.

ATTACHMENT: 2-3 marked up 9/25/92

- 8.8.6 Complete any open paperwork related to Exception/Repair Log entries etc.

- 8.8.7 The Rod Extraction System's System Operational Test is completed.

W. M. Chapman 9/25/92
Test Conductor Date

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 8/6/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE _____

PROCEDURE SECTION(S) See below

PROCEDURE CHANGE: (Use reverse side if necessary.)

Perform minor procedure correction, as follows:

1. on Page 4, add G.S. "Dial Indicator" which was used in ~~test~~^{File 192} Section 8.1.3 nail deflection testing.
2. on Page 14, Step 8.1.3.3, add Dial Indicator Calibration Data to demonstrate that the measurement was made with a calibrated device.
- ~~3. on Page 16, Step 8.1.4.5, revise gripper sequence to left to right, replace "right" with "left", since the device is already located here - 8/6/92~~

Continued on Page 2.

REASON FOR CHANGE:

see the individual changes above.

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☐ NO ☐

MAJOR ☐ YES ☐ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

David M. Chapman 8/6/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE

9315-TP-201

REVISION 0

APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 8/6/92PROCEDURE NO. 9315-TP-201REV. 0

TITLE _____

PROCEDURE SECTION(S) See below

PROCEDURE CHANGE: (Use reverse side if necessary.)

3. Step 8.1.4.1.5, Page 16, revise "right" to "left"
Step 8.1.4.2.2, Page 20, revise "right" to "left"
Step 8.1.4.2.7, Page 21, revise "left" to "right"
Step 8.1.4.1.11, Page 17, revise "left" to "right" } Testing is performed from left to right. This does not impact test validity but represents reading convention.
4. Step 8.1.4.1.12, Page 18 } add liner to clarify correspondence of data.
Step 8.1.4.1.13, Page 19 }
5. Step 8.1.5.1.2, Page 24 - add "M-107A" to clarify data applicability.
6. Step 8.1.5.2.2, Page 25 - add "M-107B" to clarify data applicability.
7. Step 8.1.6.2.1, Page 28 } delete these steps since this is the starting condition.
Step 8.1.6.2.2, Page 28 }

ST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE TPCN 6

E 8/7/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE

PROCEDURE SECTION(S) 8.1.2, Page 37, Step 3

PROCEDURE CHANGE: (Use reverse side if necessary.)

Revise acceptance criteria to read; "Report is generated defining Fault condition." deleting "...when commanded by operator"

REASON FOR CHANGE:

Alarm report is automatic. TAC Change Notice 001 corrects the TAC.

SIGNIFICATION OF CHANGE

MINOR YES NO

MAJOR YES ☒ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

<u>William E. Elman</u>	8/7/92 (1)(2)
TEST ENGINEER	DATE
<u>Peter G. Gidd</u>	9/24/92 (2)
QUALITY ASSURANCE	DATE
<u>Frank Snells</u>	10/6/92 (2)
PROJECT ENGINEER	DATE
<u>James M. Smith</u>	10/6/92 (2)
TEST DIRECTOR	DATE

- (1) Required for minor changes
- (2) Required for major changes

CLIENT:	FILE NO.:	BY:	PAGE OF
SUBJECT: TPCN 4 TPCN		CHECKED BY:	DATE:

- # Coverage
- 7 "140 to 200" to "100 to 200 lbs"
 - 8 Delete Steps 8.4.3 to 8.11.7 RL 25
 - 9 Rods 1" East of Clamping Table
 - 10 Steps 8.7.5 etc - delete hand made specification
 - 11 steps 8.7.14 & 15 allow manual rod insertion into the grippers
 - 12 Delete final distance entries steps 8.7.11 & 40.
 - 13 step 8.3.7 Message $\Rightarrow$ Single mode pause $\Rightarrow$ continue

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/1/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE _____

PROCEDURE SECTION(S) TPCW SECTION 8.5

PROCEDURE CHANGE: (Use reverse side if necessary.) RL # 24

Revise test procedure steps From "140 to 200 lbs" to "100 to 200 lbs".
Step 8.5.12, 8.5.24, 8.5.30, 8.5.48, 8.5.63, 8.5.75, 8.5.87, & 8.5.99

REASON FOR CHANGE: _____

Required value is 100 to 200 lbs in this configuration

CLASSIFICATION OF CHANGE _____

MINOR ☒ YES ☐ NO

MAJOR ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

David M. Chan 9/1/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes:
- (1) Required for minor changes
 - (2) Required for major changes

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/2/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE _____

PROCEDURE SECTION(S) TPCN 4 8.4.3 to 8.4.7

PROCEDURE CHANGE: (Use reverse side if necessary.) Reference Exception/Repair Log #25
Delete steps 8.4.3 to 8.4.7 From tpcn 4 testing.

REASON FOR CHANGE:

Discrepancy between 100 and 181 ipm is too great to resolve by parameter adjustments.

CLASSIFICATION OF CHANGE

TPCN 001, alter S address 181 ipm.

MINOR ☐ YES ☐ NO ☐

MAJOR ☒ YES ☐ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

<u>W. M. Chapman</u>	<u>9/2/92</u>	(1)(2)
TEST ENGINEER	DATE	
<u>R. M. M. M.</u>	<u>9/2/92</u>	(2)
QUALITY ASSURANCE	DATE	
<u>P. M. M. M.</u>	<u>9/2/92</u>	(2)
PROJECT ENGINEER	DATE	
<u>[Signature]</u>	<u>9/2/92</u>	(2)
TEST DIRECTOR	DATE	

- Notes:
- (1) Required for minor changes
 - (2) Required for major changes

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/4/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE

PROCEDURE SECTION(S) TPCN 4, Section 8.7

PROCEDURE CHANGE: (Use reverse side if necessary.)

Step 8.7.4, 8.7.33

Correct "5/16 to 1-1/16^{inch} West" to "5/16 to 1-1/16^{inch} East"

also, note on page 53 9/4/92

REASON FOR CHANGE:

Correct error in test procedure. Rods are to extend East of the Clamping Table

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☐ NO

MAJOR ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

William Chapin 9/4/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes:
- (1) Required for minor changes
 - (2) Required for major changes

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/9/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE

PROCEDURE SECTION(S) TPCN 4 Step 9.7.5, 8.7.13, 9.7.34, & 8.7.42

PROCEDURE CHANGE: (Use reverse side if necessary.)

~~Before 9/9/92~~ Delete "in the HAND mode" since operations between setpoints can be performed in both the HAND mode and the TCE mode. Testing on 9/9/92 is performed in the TCE mode to assure rod insertion into the gripper.

REASON FOR CHANGE:

To accommodate field conditions for testing on 9/9/92.

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☐ NO

MAJOR ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

David M. Elmer 9/9/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes:
- (1) Required for minor changes
 - (2) Required for major changes

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/9/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE _____

PROCEDURE SECTION(S) TACW 4 Steps 8.7.14 to 8.7.18

PROCEDURE CHANGE: (Use reverse side if necessary.) See RL # 39

Revise steps 8.7.14 and 8.7.17 to read "Verify or ensure that..."

REASON FOR CHANGE:

To facilitate manual alignment of rods in the gripper for testing performed on 9/9/92.

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☐ NO

MAJOR ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

Nigel M. P. [Signature] 9/9/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes:
- (1) Required for minor changes
 - (2) Required for major changes

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/9/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE _____

PROCEDURE SECTION(S) TPCW 4 steps 8.7.11-543

PROCEDURE CHANGE: (Use reverse side if necessary.)

Delete the "Final Distance" entries

REASON FOR CHANGE:

This date is irrelevant since travel distance is measured directly.

CLASSIFICATION OF CHANGE

MINOR ☒ YES _____ NO _____

MAJOR _____ YES _____ NO _____

REVISION TO ORIGINAL PROCEDURE REQUIRED _____ YES ☒ NO

APPROVALS

W. J. M. P. H. 9/9/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes:
- (1) Required for minor changes
 - (2) Required for major changes

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-2

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/16/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE

PROCEDURE SECTION(S) TPCN 4 step 8.3.7

PROCEDURE CHANGE: (Use reverse side if necessary.)

Revise to add "and CONTINUE" before "start timing".

REASON FOR CHANGE:

Single mode operation presents the operation message before the single stop pause
See RL # 45.

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☐ NO

MAJOR ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

David M. Chen 9/16/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for minor changes
(2) Required for major changes

CLIENT:	FILE NO.:	BY:	PAGE OF
SUBJECT: TP2C1 limited Testing 12/1		CHECKED BY:	DATE

- ✓1 Camera 7 not installed
- ✓2 Gripper exceeds 200 H
- ✓3 Did not get min 160 H OITL #261
- ✓4 Camera call 4:7, not 7:8
- ✓5 Rod failure to drop OITL #261
- ✓6 Load cell setpoint To hp 202
- ✓7 Gripper too out fault IXWC38
- ✓8 Deflection gauge not calibrated
- ✓9 Gripper too out, see RLW7
- ✓10 Wrong RL forms used
- ✓11 FAT not signed off OITL 203
- ✓12 120 to 130 ipm - See PCN 4
- ✓13 Failure to grip all rods - See PCN 4

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-3

REPAIR LOG

KL # 1

DATE 6/30/92

PROCEDURE NO. 9315-TP-201

REV. 0

TITLE RED EXTRACTION

PROCEDURE SECTION(S) 2.15, Page 3 8/6/92

PROBLEM AND CAUSE:

CAMERA NO. 7 NOT AVAILABLE AT START OF TEST

SOLUTION/CORRECTIVE ACTION:

CAMERA 7 IS BEING INSTALLED AND WILL BE AVAILABLE WHEN NEEDED

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☐ NO

REDESIGN ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

2. B. Frost 6/30/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes:
- (1) Required for repair
 - (2) Required for redesign

Camera 7 was installed for testing related to Camera 7

Closed
Virgil M. Chan
8/6/92

TEST PROCEDURE 9315-TP-201

REVISION C

APPENDIX 0-3

REPAIR LOG

2

DATE 7/1/92

PROCEDURE NO. 9315-712-201

REV. 5

TITLE Rib Extraction

PROCEDURE SECTION(S) 8.1.4.1, Page 18 ^{REV 12}

PROBLEM AND CAUSE:

Gripper No 2 had pull force
exceeding 200 lbs. Cause was due to
rod being inserted too far into gripper.
This exception also applies to grip - 11 - re.

This exception also applies to gripper #7 ^{rev} 04/92

SOLUTION/CORRECTIVE ACTION:

ION/CORRECTIVE ACTION: Rules were change so that
invention was ~ $\frac{3}{4}$ of inch. Retested in
sequence 2 show acceptable performance

CLASSIFICATION OF CHANGE

REPAIR _____ YES _____ NO _____

REDESIGN _____ YES _____ NO _____

REVISION TO ORIGINAL PROCEDURE REQUIRED _____ YES _____ NO

APPROVALS

Eric Finkert 7/1/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER (2) DATE

TEST DIRECTOR _____ DATE _____ (2)

- otes: (1) Required for repair
(2) Required for redesign

Completed.
Testing as per TCR 4 indicated that maximum misalignment would not exceed 500 lbs of pulling force which was the administrative limit for EIT testing. Pull head design is to be changed in a later phase to eliminate this potential problem.
SFC OITL # 261.

David M. Chap — 9/10/92

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-3

REPAIR LOG

3

DATE 7/2/92PROCEDURE NO. 9315-TP-201 REV. 0 TITLE ROD EXTRACTIONPROCEDURE SECTION(S) 8.1 4. 2, Page 20, 22, 23 8/6/92

PROBLEM AND CAUSE:

Minimum acceptance criteria (160 lbs) was not attained for several of the single rod pull test.
 All rods were above 140 lbs.

SOLUTION/CORRECTIVE ACTION:

Except as is Most rods showed higher pull force in second sequence.

CLASSIFICATION OF CHANGE

REPAIR YES NOREDESIGN YES NOREVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

The acceptance criteria is not revised. The current design does not always meet the criteria but the rods are adequate to perform Integrated System Testing. See Open Item Tracking List Item 261
 UNChapman 8/6/92

EB Farret 7/2/92 (1)(2)
 TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
 (2) Required for redesign

Completed.
 Pull tests will be designed in a later phase to eliminate current problems. See CITE 261.

David M. Chan 9/10/92

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-3

REPAIR LOG

4

DATE 7/3/92

PROCEDURE NO. 9315-TP-201 REV. 0

TITLE Rod Extraction

PROCEDURE SECTION(S) 8.1.6.1 step 7
8.1.6.2, 8.1.7.1, 8.1.7.2 16 Hz

Page 26, Step 5 & 7
Page 27, Step 9
8.1.6.2 Page 28, Step 5 Page 30, Step 9
Page 29, Step 7 Page 31, Step 4
Page 32, Step 6 Page 33, Step 2

PROBLEM AND CAUSE:

Camera call should camera 4 & 7 instead of 8 & 7

Page 34, Step 4
Page 35, Step 6
Page 36, Step 8, 16 Hz

SOLUTION/CORRECTIVE ACTION:

Determination needs to be made on which camera is desired. Camera 8 does not allow counting of rods pulled. It would show rods stuck in gripper

CLASSIFICATION OF CHANGE

REPAIR YES NO
REDESIGN ☒ YES NO

Camera calls are revised and are tested as per PCN 4 16 Hz

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

TEST ENGINEER 7/3/92 (1)(2)
DATE
QUALITY ASSURANCE 9/29/92 (2)
DATE
PROJECT ENGINEER 10/6/92 (2)
DATE
TEST DIRECTOR 10/6/92 (2)
DATE

- Notes: (1) Required for repair
(2) Required for redesign

Completed
OCU 40 revised the camera call logic. Testing as per PCN 4 demonstrated function.

David McChapman 9/10/92

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-3

REPAIR LOG

#5

DATE 7/7/92

PROCEDURE NO. 9315-TP-201

REV. 0

TITLE Rod Extraction

PROCEDURE SECTION(S) 8.1.7.1, Page 31, Step 3
8.1.7.2, Page 34, Step 3

PROBLEM AND CAUSE:

Rods that extend 2" beyond other rods failed to drop when pull head was retracted

SOLUTION/CORRECTIVE ACTION:

Container should be changed. Rods that are inserted > 1 1/2" were shown to stick in a retest.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN ☒ YES NO

A permanent design change is needed to limit insertion to 1.5". A temporary fix will be used to complete testing as per this SET (TPCN 4). An Open Items Tracking List entry is prepared for this phase II Item # 261

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

Eng. Ernest 7/7/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign Completed See OTEL # 261.

David M. Chap 9/11/92

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-3

REPAIR LOG

6

DATE 7/7/92

PROCEDURE NO. 9315-TP-201

REV. 0

TITLE Rev EXTRACTION

PROCEDURE SECTION(S) N/A TP201 8/192

PROBLEM AND CAUSE:

NO indication of fuel present
on Clamping table load cell during
system initializing

SOLUTION/CORRECTIVE ACTION:

Load cell set pt changed to 125 for this
test DOW to be written to correct set pt.

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☒ NO

REDESIGN ☐ YES ☒ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

ErB furman 7/7/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
(2) Required for redesign

Transferred to TP202, RL #18
closed

VN Chapman 8/6/92

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-3

REPAIR LOG

#7

DATE 7/8/92

PROCEDURE NO. 9315-TP-201

REV. 0

TITLE Red EXTRACTOR

PROCEDURE SECTION(S) B.1.7.2, Page 34, Step 3

PROBLEM AND CAUSE:

Time out fault set point on all
grasper jaws needs to be reset.

SOLUTION/CORRECTIVE ACTION:

Temporary fix for Test - DCN needs
to be written

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN ^{yes from 9/1/92} YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

^{9/2/92}
Ernst 7/8/92 (1)(2)
TEST ENGINEER DATE
A. M. M. M. 4/2/92 (2)
QUALITY ASSURANCE DATE
Frank P. Mello 9/2/92 (2)
PROJECT ENGINEER DATE
[Signature] 7/8/92 (2)
TEST DIRECTOR DATE

- Notes: (1) Required for repair
(2) Required for redesign

Completed DCN # C38 issued.

W. M. M. M. 9/2/92

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-3

REPAIR LOG

8
Page 1 of 2 8/6/92

DATE 7/8/92

PROCEDURE NO. 9315-TP-201

REV. 0

TITLE Rio Extraction

PROCEDURE SECTION(S) 8.1.3 8/6/92

PROBLEM AND CAUSE:

Deflation Gauges for Rail deflection were not calibrated. Test was run with uncalibrated gauge

SOLUTION/CORRECTIVE ACTION:

Gauge calibration to be checked.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

S. B. Farrest 7/5/92 (1)(2)
TEST ENGINEER DATE

____ (2)
QUALITY ASSURANCE DATE

____ (2)
PROJECT ENGINEER DATE

____ (2)
TEST DIRECTOR DATE

- Notes: (1) Required for repair
(2) Required for redesign

Calibration was verified to be accurate.
See Page 2.

Closed Virgil M. Chap 8/6/92

INDUSTRIAL TESTING LABORATORY SERVICES CORP.

835 ALPHA DRIVE - R.I.D.C. PARK

PITTSBURGH, PA 15238

PHONE 412-963-1900

FAX 412-963-1928

TEST REPORT

PURCHASE ORDER NO. verbal
Peter V. Judd, Project Manager
c/o Contraves USA
620 Epsilon Drive
ADDRESS Pittsburgh, PA 15238
ATTENTION Mr. Judd

DATE July 16, 1992

ITLS REPORT NO. 59516

REPORT OF: Calibration of Submitted Gage.

IDENTIFICATION

Submitted for Test:

One (1) Starrett dial indicator .185" maximum
range (cover glass is missing)

Procedure:

ITLS QAP-201 Rev. 4

RESULTS

The dial indicator was checked against Webber-Starrett Gage Block, S/N 3.1469CRSA4,
calibrated (by Webber) traceable to NIST at ten (10) points. The temperature was 72F.
Actual data obtained listed below.

<u>Gage Blocks</u> (in.)	<u>Indicator</u> (in.)
.020	.020
.030	.030
.040	.041
.050	.051
.100	.101
.130	.131
.140	.142
.150	.152
.170	.172
.180	.182

INDUSTRIAL TESTING LABORATORY SERVICES

KEITH T. PURNELL
Quality Assurance Engineer

KTP/js

DURING OUR MANUFACTURING PROCESSES, TESTS, AND INSPECTIONS, THE PRODUCT DID NOT COME IN DIRECT CONTACT WITH MERCURY OR ANY OF ITS COM-
POUNDS NOR WITH ANY MERCURY CONTAINING DEVICES EMPLOYING A SINGLE BOUNDARY OF CONTAINMENT.
KNOWINGLY AND WILLFULLY FALSIFYING OR CONCEALING A MATERIAL FACT ON THIS FORM OR MAKING FALSE OR FICTITIOUS OR FRAUDULENT ENTRIES ON THIS
FORM COULD CONSTITUTE A FELONY PUNISHABLE UNDER FEDERAL STATUTES.

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / ^{Normal} REPAIR LOG

#9

DATE 7/31/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rod Extraction

PROCEDURE SECTION(S)

PROBLEM AND CAUSE:

Testing as per TP-201 resulted in ERL #21 which is applicable to the Rod Extraction System. See Page 2.
^{un- 40 Hz} Rod Pull Head Drive Time-out was increased to avoid overtime alarm.
 Rod Gripper

SOLUTION/CORRECTIVE ACTION:

Evaluate time out alarm setpoint after completion of TPCN 4 testing.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

David M. Chapman 2/6/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
 (2) Required for redesign

Completed. See ERL #7 and DCN38

David M. Chapman 9/2/92

TEST PROCEDURE 9315-TP-207

REVISION 1

PAGE 03

EXCEPTION/REPAIR LOG

DATE 7/23/92

LOG 21

PROCEDURE NO. 9315-TP-207

REV. 1

TITLE

SYSTEM OPERATIONAL TEST PROCEDURE
FOR THIS SIDE TRANSFER COMPACTOR
LOADING AND UNLOADING TABLE

PROCEDURE SECTION(S) 8.5.15

CLASSIFICATION OF CHANGE: REPAIR ☒ REDESIGN ☐ TPCN# ☐

PROBLEM AND CAUSE:

Grippers were faulting due to 'over time' in travel.

TEST CONDUCTOR

F. H. Ballo

SOLUTION/CORRECTIVE ACTION:

Increase the 'TIME out' of the grippers. This was
temporarily done for this test and the problem was eliminated

NOTE This ERL is against the extraction system tested under 9315-TP-201

TEST CONDUCTOR Frank H. Ballo

DATE 7/23/92

QUALITY ASSURANCE

DATE (1)

PROJECT ENGINEER

DATE (1)

TEST DIRECTOR

DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

TEST CONDUCTOR

DATE

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / ^{FINAL} REPAIR LOG

#10

DATE 8/6/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rev Extraction

PROCEDURE SECTION(S) Appendix D

PROBLEM AND CAUSE:

Wrong forms are used for Exception/Repair Log Entries.

SOLUTION/CORRECTIVE ACTION:

Sign off each repair log as closed when closed (complete)

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☐ NO

REDESIGN ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

Daniel M Chapman 8/6/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
(2) Required for redesign

Completed
all other exceptions signed off completed.

Daniel M Chapman 8/25/92

3 of 7

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / ^{ORIGINAL} REPAIR LOG

11

DATE 8/6/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Red Extraction

PROCEDURE SECTION(S) 2.9 Page 2

PROBLEM AND CAUSE:

The Red Extraction System FAT 9315-TP-230-1322 was not signed off as completed as of 6/30/92. The FAT did not complete intended testing related to proximity sensor location and cable management. However, component replacement testing was deferred.

SOLUTION/CORRECTIVE ACTION:

The FAT was completed sufficiently to perform SOT testing. SOT testing was performed with the cable management system installed. Proximity sensor locations are revised but function is verified in SOT testing. FAT closure may be accomplished later.

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☐ NO

REDESIGN ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

Note - proximity sensor locations do not provide protection for hands by contact in programmed modes of operation.
mc
9/1/92

Daryl M. Chapman - 8/6/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
(2) Required for redesign

Completed
SOT testing, demonstrated proximity sensor function

Daryl M. Chapman 9/1/92
See GITH 263 9/1/92

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX C-3

EXCEPTION / ^{FORM} REPAIR LOG

RLB12

DATE 8/6/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rad Extraction

PROCEDURE SECTION(S) 3.1.2.1 Page 11 & 12
3.1.2.2 Page 13

PROBLEM AND CAUSE:

The 201, Revision 1 and test procedure both require that the maximum or peak rad extraction speed be 120 to 130 ipm. The test procedure is only prepared to capture average speed data. The obtained data does not reflect the required speed (or time) for throughput. TAC change Notice 001 revises this criteria and TPCN #4 performs testing of the revised criteria.

SOLUTION/CORRECTIVE ACTION:

Implement testing as per TPCN #4.

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☐ NO

REDESIGN ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

Virgil McChesney 8/6/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

TPCN #4 is prepared.

Closed

Virgil McChesney

TEST PROCEDURE

9315-TP-201

REVISION

0

APPENDIX C-3

EXCEPTION / ^{FINAL} REPAIR LOGDATE 8/6/92PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rev ExtractionsPROCEDURE SECTION(S) 8.1.2 Step 3, Page 34

PROBLEM AND CAUSE:

As per test log entry on 7/21/92.

1. On the first attempt, some rods were pushed back as the pull head advanced on bowed rods.
2. Once the push back problem was fixed, 33 of 34 rods were grabbed on the second attempt.
3. The 34th rod was grabbed upon programmed option retry.

SOLUTION/CORRECTIVE ACTION:

TPCN 4 re-performs this section to demonstrate success on first try.

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☐ NO ☐REDESIGN ☐ YES ☐ NO ☐REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

W. M. Elmer 8/6/92 (1) (2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
(2) Required for redesign

Completed

Subsequent information indicates that the problem was due to a higher friction on inadequately restrained test rods. A steel fuel assembly would provide adequate restraint.

W. M. Elmer 9/10/92

CLIENT	FILE NO	BY	PAGE OF
SUBJECT	RL LOG TP001 TP004	CHECKED BY	DATE

- ✓14 Step 8.1.5 Still need to get 17x17 speed setpoints
- ✓15 Step 8.1.6 MT not functioning / SAFE position OITL #260
- ✓16 Step 8.1.7 Camera 3 not functioning
- ✓17 8.1.9 Pull Head Drive A, when homed, has FWD & BACK illuminated
- ✓18 8.1.9 IMTC FAULT on gripper HAND Mode operations
- ✓19 8.1.6 Interference CCTV Camera 3 & MT
- ✓20 8.1.2 Step 8.1.2 (Accountability clear) signed off in error.
- ✓21 8.5.6 Static pull head gripper force indication OITL #261 ~~has~~
- ✓22 8.1.9 IMTC Fault on Jaw operations - at start KRIS OITL 264
- ✓23 8.2.29 M1078 Fast West ECT - no fault light in M1078 in message
- ✓24 8.5.63 Rod slips at 135 #
- ✓25 8.4.7-7 Delet going after 1811pm
- ✓26 8.1.9 Back indicator ON at second hold point
- ✓27 8.1.3 Clamping Table faults on homing
- ✓28 8.5.4 Failure to get Side Transfer BACK interlock (Auto Mode interlock)
- ✓29 8.5.9 Overhead sequence for section 8.5.
- ✓30 8.5.87 Jaw 38 slipped at 95 #
- ✓31 8.5 M1078 pulling force indications not constant OITL 258
- ✓32 8.5 Pull Head Drive A electrical connector damage
- ✓33 8.3.45 Single Mode sequence failed to go to 3rd hold point
- ✓34 8.3.32 Pull Head Drive Speed not set at desired value KRIS
- ✓35 8.3 Annotate Section 8.3 for data collected on 9/1/92
- ✓36 N/A Red Compaction carriage contacts good in retraction process
- ✓37 8.3.19 1st Hold Point Camera call got 45.7, not 35.7.
- ✓38 8.7.46:35 Did not get 3/8 to 5/8" insertion length.
- ✓39 8.7.43 Rods were not aligned with the gripper
- ✓40 8.7.11 etc Rod insertion length offset is limited to ~1 1/4"
- ✓41 8.7.29 Two rods failed to drop Pull Head A
- ✓42 8.7.24:49 Banded & offset rod problems
- ✓43 8.7.25:51 Rod drop contact with electrical components OITL 262
- ✓44 8.3.47 Did not get gripper head retract time
- ✓45 8.3.7 Static Mode Pause message sequence
- ✓46 8.5.59 No backup coverage for Camera 2 OITL 259
- ✓47 8.3.57 CCTV Camera 8 visual interference OITL 257

2011

TEST PROCEDURE 9315-TP-201

REVISION 2

APPENDIX C-3

EXCEPTION / ^{GENERAL} REPAIR LOG

DATE 2/26/92

PROCEDURE NO. 935-TF-2.1 REV. 0 TITLE Red Extraction

PROCEDURE SECTION(S) FOUO L1 2.1.2

PROBLEM AND CAUSE:

Still need to verify, programmed w/ 17 x 17 speed setpoint for Bull Head Drives.

SOLUTION/CORRECTIVE ACTION:

Obtained selfpoints and parameters for Red Extraction System for $W(17 \times 17)$

CLASSIFICATION OF CHANGE

REPAIR _____ YES _____ NO ☒

REDESIGN YES NO ☒

REVISION TO ORIGINAL PROCEDURE REQUIRED _____ YES _____ ☒ NO

APPROVALS

A. J. M. O. Chap 26/1/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE _____ DATE _____ (2)

PROJECT ENGINEER _____ DATE _____ (2)

TEST DIRECTOR _____ DATE _____ (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed
Miss Chapman 8/31/92

Environmental Corporation

RL#15

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-3

EXCEPTION / ^{FIELD} REPAIR LOG

DATE 8/26/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Red Extraction

PROCEDURE SECTION(S) TPCN 4 Step 2.1.6

PROBLEM AND CAUSE:

1. MT is not functional due to missing power supply
2. Final SAFE position is not established

SOLUTION/CORRECTIVE ACTION:

1. Manually moved MT to clear camera on 9/9/92. MT was placed at West hand stop. Completed work on 9/10/92
2. Final Safe Position on Camera 3's location must be such that the Clamping Table's lower clamp is observable.

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☐ NO

REDESIGN ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

David M. Chap 7/10/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed. See OIR #260

David M. Chap 9/10/92

RL 411

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-3

EXCEPTION / ^{Final} REPAIR LOG

DATE 8/26/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Red Extraction

PROCEDURE SECTION(S) TDCN 4 2.1.6

PROBLEM AND CAUSE:

Camera #2 is not functional.

SOLUTION/CORRECTIVE ACTION:

Repair camera #2

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☐ NO

REDESIGN ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

David McChap 9/10/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes:

(1) Required for repair

(2) Required for redesign

Completed

Camera 2 is functional and provides required coverage.

David McChap 9/10/92

R2 #17

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX 2-3

EXCEPTION / ^{REPAIR} REPAIR LOG

DATE 2/26/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE RVD Extraction

PROCEDURE SECTION(S) TPEN4 Step 2.1.9

PROBLEM AND CAUSE:

After homing Pull Head Drive A MIC7A had both BACK & FWD indications illuminated

SOLUTION/CORRECTIVE ACTION:

Problem was corrected during preparation for DAE demonstration Cause and resolution are unknown

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☐ NO

REDESIGN ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

David M. Chapman 2/27/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE (2)
DATE

PROJECT ENGINEER (2)
DATE

TEST DIRECTOR (2)
DATE

- Notes: (1) Required for repair
(2) Required for redesign

Completed
David M. Chapman 2/27/92

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX C-3

EXCEPTION / ^{FORMAL} REPAIR LOGDATE 8/26/92PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rev. EXTRACTORPROCEDURE SECTION(S) TPC04 8.1.9

PROBLEM AND CAUSE:

While operating Gripper Jaw 1A M107C in the HAND Mode, observed IMTC
FAULT alarm in opening and closing.

SOLUTION/CORRECTIVE ACTION:

Supervisory Station's RS-232 Communications Board is replaced ^{checked} re-initialized.

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☐ NO ☐REDESIGN ☐ YES ☐ NO ☐REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

David M. Chapman 8/27/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed
David M. Chapman 8/27/92

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX C-3

EXCEPTION / ^{ORIGINAL} REPAIR LOG

DATE 8/31/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Red Extraction

PROCEDURE SECTION(S) 8.1.6 of TPCN4

PROBLEM AND CAUSE:

Verified that an interference exists for CCTV Camera #3's coverage of the lower clamps on the Clamping Table due to the Manipulator Transporter SAFE position. Visual coverage is blocked by the MT's bridge.

SOLUTION/CORRECTIVE ACTION:

Open the MTAN fault. See RL#15

CLASSIFICATION OF CHANGE

REPAIR ☒ YES ☐ NO

REDESIGN ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

David M. Elmer 9/10/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes:
- (1) Required for repair
 - (2) Required for redesign

Completed. See RL#15

David M. Elmer 9/10/92

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX C-3

EXCEPTION / ^{ORIGINAL} REPAIR LOG

DATE 9/1/92

PROCEDURE NO. 9315-TP-201

REV. 0

TITLE Rev. Extraction

PROCEDURE SECTION(S) 8.1.2 of TPCN 4

PROBLEM AND CAUSE:

Step 8.1.2 signed off on 8/31/92 based on assumption that operator had cleared the system. Accountable materials indication is noted on 9/1/92

Serial 1. PW13

Serial 2. PW14

SOLUTION/CORRECTIVE ACTION:

Clear the system as per step 8.1.2. Sign-off the step a second time. This may be done just before performing automatic operations.

CLASSIFICATION OF CHANGE

REPAIR YES NO ☒

REDESIGN YES NO ☒

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO ☒

APPROVALS

Original M. E. Chen 9/1/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes:

- (1) Required for repair
- (2) Required for redesign

Completed.

8.1.2 required clearing the system. 8.2.1 required simulation accountabilities system operations were accomplished as required to support testing.

Original M. E. Chen 9/1/92

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / ^{701AL} REPAIR LOG

DATE 9/1/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Riv Extractions

PROCEDURE SECTION(S) 8.5.6 OF TPCN 4

PROBLEM AND CAUSE:

Noted that static pull head gripper forces were indicated with grippers open

M-107C 41.717	M-107G 11.1111
M-107D 218.315	M-107H 91.511
M-107E 18.408	M-107I 11.415
M-107F 516.928	M-107J 11.1111

Step 8.5.63: On pull force testing, observed reset problems for gripper pull force indications. The zeroing of the tare weight is not being accomplished and pulling forces seem to be adding across application of pulling force.

SOLUTION/CORRECTIVE ACTION:

PCN 43 was implemented to reverse the reset logic which eliminates the tare weight from gripper closure. A temporary change was made in the logic to see if the change made a difference. The change did effectively solve the reset problem. The residual software problem of a zero reset in pulling is not needed. See PCN 31.

CLASSIFICATION OF CHANGE

REPAIR ☐ YES ☐ NO

REDESIGN ☒ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

<u>David M. Chapman</u>	9/14/92 (1)(2)
TEST ENGINEER	DATE
<u>Peter J. Juhl</u>	9/29/92 (2)
QUALITY ASSURANCE	DATE
<u>E. D. Bullo</u>	10/6/92 (2)
PROJECT ENGINEER	DATE
<u>[Signature]</u>	10/6/92 (2)
TEST DIRECTOR	DATE

- Notes: (1) Required for repair
(2) Required for redesign

~~Completed see PCN 251 - 9/1/92~~
~~David M. Chapman 9/1/92~~

Completed
PCN 43 reflects the final design.
David M. Chapman 9/10/92

8.5 ROD PULLING FORCE COMPARISON**NOTE**

In this section, rod pulling forces will be measured using a force gauge and this data will be compared with the data recorded by the pull force load cells. There are four pulling force load cells in each W 17 X 17 pull head which sample the pulling forces for the grippers. This testing will be performed for a test rod in alignment with each load cell.

- 8.5.1 Place the Rod Extraction System in the JOG Mode.
- 8.5.2 Open all gripper JAWs.
- 8.5.3 Position the Clamping Table as required to support this testing.
- 8.5.4 Retract PULL HEAD DRIVE B M-107B toward the East end-of-travel for clearance.
- 8.5.5 Extend PULL HEAD DRIVE A M-107A towards the West end-of-travel for convenience of test set-up.
- 8.5.6 Record the initial gripper-OPEN FORCE indications for Pull Head Drive A M-107A.

JAW 1-A M-107C FORCE: 0 lbs

JAW 1-B M-107D FORCE: 0 lbs

JAW 1-C M-107E FORCE: 0 lbs

JAW 1-D M-107F FORCE: 0 lbs

Pull Head Drive A Northernmost Pulling Force Load Cell

8.5.7 Insert the test rod and force gauge in alignment with the northernmost pull head drive load cell for a nominal 1/2 inch grip.

8.5.8 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.

8.5.9 Close the gripper JAWS for PULL HEAD DRIVE A M-107A.

8.5.10 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive A M-107A.

JAW 1-A M-107C FORCE: 26.6 lbs

JAW 2-A M-107D FORCE: 9.9 lbs

JAW 3-A M-107E FORCE: 5.9 lbs

JAW 4-A M-107F FORCE: 2.4 lbs

8.5.11 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: 0

Type of Measuring Device: FORCE GAUGE Range: _____

ID Number: _____ Calibration Due Date: _____

8.5.12 Operating PULL HEAD DRIVE A M-107A in the JOG Mode, retract the drive until a force of 140 to 200 lbs is indicated on the force gauge. 100 ¹⁰⁰ 1700 1/2

8.5.13 Record the loaded Force Gauge indication:

FORCE GAUGE LOAD INDICATION: 136 ¹³⁶

8.5.14 Record the extraction **FORCE** indications for Pull Head Drive A M-107A.

JAW 1-A M-107C FORCE: 126.9 lbs

Released Valve
(7.2)

JAW 2-A M-107D FORCE: 20.3 lbs

JAW 3-A M-107E FORCE: 11.8 lbs

JAW 4-A M-107F FORCE: 7.3 lbs

data collected
12/15/92
12/15/92

8.5.15 Take a photograph of the test set-up under load.

PHOTO: _____

APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/1/92

PROCEDURE NO. 9315-T12-201 REV. 0 TITLE R.D. EXTRACTION

PROCEDURE SECTION(S) 8.1.9 of TPCNLI

PROBLEM AND CAUSE:

While operating grippers in HAND Mode, observed a few INTC FAULTS for high torque. Operation continued after CONTINUE.

SOLUTION/CORRECTIVE ACTION:

Evaluate revising window at start of travel to deal with starting current.

CLASSIFICATION OF CHANGE

Wright M. Chapman 9/2/92

REPAIR _____ YES _____ NO _____

REDESIGN _____ YES _____ NO _____

REVISION TO ORIGINAL PROCEDURE REQUIRED _____ YES ☒ NO

APPROVALS

Problem is intermittent now
and should go away with
redesigned pull heads.

1. [Signature] 9/11/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE _____ DATE _____ (2)

PROJECT ENGINEER _____ DATE _____ (2)

TEST DIRECTOR _____ DATE _____ (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed
See CITH # 264

Wigil M Chap 9/11/94

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / ^{FINAL} REPAIR LOG

DATE 9/1/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rev EXTRACTOR

PROCEDURE SECTION(S) 8.2.29 & TRENCH

PROBLEM AND CAUSE:

M107E at West FCT in JCC Mode, did not observe fault light and message stated "M107A"

SOLUTION/CORRECTIVE ACTION:

No action required. The controller can only report one fault condition at a time. When the first fault is cleared, the next is enabled.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

Wm. M. Chen 9/1/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
(2) Required for redesign

Completed
VNChapman 9/1/92

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / ^{NOTAL} REPAIR LOG

DATE 9/1/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rev EXTRACTOR

PROCEDURE SECTION(S) 8.5.62 TPCN4

PROBLEM AND CAUSE:

TPCN4 requires 140 to 200 lbs pulling force. Obtained ~135 lbs before slippage.
Applicable criterion is 100 to 200 lbs.

SOLUTION/CORRECTIVE ACTION:

Revise TPCN4 for 100 to 200 lbs. TPCN7

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES ☒ NO

APPROVALS

David M. Chas 9/1/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
(2) Required for redesign

Completed. TPCN7 implemented See Attachments 1 & 2
David M. Chas 9/1/92

1.3.9 Acceptance Criteria

Each individual gripper alone was capable of rod pull force of 160 to 200 lbs.

Test Results

Testing for 17 X 17 pull heads as per Section 8.1.4.2 was performed. Testing for the 15 X 15 and 8 X 8 pull heads was not performed in the refocused Phase III test program.

The initial criteria required 160 to 200 lbs of pulling force. Initial testing as per Section 8.1.4.2 obtained data over two cycles for each pull head. The data ranged from 140 to 195 lbs. Exception/Repair Log # 3 was prepared recommending that the lower limit be reduced to 140 lbs.

The lower limit is not reduced in Phase III testing. Rather, this failure is carried as an open item for Phase IV. Test results are adequate to support performance of the integrated system test for normal operations.

Testing as per TPCN 4 readressed this issue in the comparison of pulling force indications and actual pulling forces. TPCN 4 was prepared using the 140-200 lb pulling force objective with all grippers loaded. Exception/Repair Log 24 to TPCN 4 reported that a pulling force of about 135 lbs was observed before slippage. The exception is dispositioned by TPCN 7 and this entry in the Test Results and Analysis Report.

The TAC was prepared using two criteria. Pulling forces for single rods only was to be 160 to 200 lbs. Pulling forces for multiple rods was to be 100 to 200 lbs. This addressed the current design. A better design is practical, see Recommendation 3.1.1.2 below. This design would be able to accomplish the original design intent of 160 to 200 lbs independent of the number of rods.

9315-TP-201 TPCN 4
ERL # 24
ATTACHMENT 1

RAFT

- 3.1.1.2 Redesign pull head grippers such that the design 160 to 200 lbs pulling force may be attained for all grippers for all rod counts in the grippers and for insertions lengths of 0.5 to 2.0 inches.

DRAFT
The Phase II design of the grippers allowed for a very short rod drop. In Phase III design, the grippers were redesigned to address a deformation problem under load. This redesign raised the grippers sufficiently to allow for a better gripper design. The increased rod drop is acceptable. A design is possible which would eliminate the pulling force "tare weight" loading from gripper closure and allow for better rod management.

The implementation of this new design would provide a nominal 3/4 inch gripping surface only. The current implementation provides a gripping surface proportional to the rod insertion length.

The implementation of this new design would eliminate the insertion length problem currently resolved with temporary inserts. Rods would more readily drop from a pivoting lower jaw.

Pull Head Drive B Northernmost Pulling Force Load Cell

8.5.58 Insert the test rod and force gauge in alignment with the northernmost pull head drive load cell for a nominal 1/2 inch grip.

8.5.59 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.

8.5.60 Close the gripper JAWS for PULL HEAD DRIVE B M-107B.

8.5.61 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 5.356 lbs

JAW 2-B M-107H FORCE: 4.679 lbs

JAW 3-B M-107I FORCE: 13.698 lbs

JAW 4-B M-107J FORCE: 28.108 lbs

8.5.62 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: 0

Type of Measuring Device: FORCE GAUGE Range: _____

ID Number: _____ Calibration Due Date: _____

8.5.63 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, retract the drive until a force of 140 to 200 lbs is indicated on the force gauge. TPCN 7
vnc
9/1/12

8.5.64 Record the loaded Force Gauge indication:

FORCE GAUGE LOAD INDICATION: 132 (Slipping h)

8.5.65 Record the extraction **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 17.59 lbs

JAW 2-B M-107H FORCE: 8.02 lbs

JAW 3-B M-107I FORCE: 32.723 lbs

JAW 4-B M-107J FORCE: 9.135 lbs data vnc
9/1/12

8.5.66 Take a photograph of the test set-up under load.

PHOTO: _____

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / ^{FORM} REPAIR LOG

DATE 9/2/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rio Extraction

PROCEDURE SECTION(S) 8.1.9 & Section 8.4 TPCN4

PROBLEM AND CAUSE:

Data collected during performance of Step 8.1.9 indicates that the extractor speed between the second ^{high} first and second hold points is about 100 ipm. The desired speed is in excess of 180 ipm.

SOLUTION/CORRECTIVE ACTION:

It is not felt that it is worthwhile to try to increase the extraction speed to obtain the desired speed in Phase III. The discrepancy is too great and may require doubling the base speed of the motor. Delete Steps 8.4.3 to 8.4.7 of TPCN4 - TPCN8

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES ☒ NO

APPROVALS

David M. Chapman 9/2/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
(2) Required for redesign

Completed V. N. Chapman 9/10/92
Fuel Preparation remains the critical path
See Open Items Tracking List #265 9/10/92

TEST PROCEDURE 9315-1P-201 REVISION 0 APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/3/92

PROCEDURE NO. 9315-1P-201 REV. 0 TITLE Red Extraction

PROCEDURE SECTION(S) 8.1.9 FTDON 4

PROBLEM AND CAUSE:

Observed that the Pullhead BACK indicator was illuminated for both drives at the second hold point

SOLUTION/CORRECTIVE ACTION:

Reverse setpoint to illuminate at the third hold point.

CLASSIFICATION OF CHANGE

N/A VVC

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

W. J. M. Chapman 9/3/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed 9/1/92 W. J. M. Chapman

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/3/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rev EXTRACTOR

PROCEDURE SECTION(S) 8.1.3 OF TPCN 4

PROBLEM AND CAUSE:

Clamping Table faulted on homing. Apparent clearing and immediate re-activation of proximity sensor.

SOLUTION/CORRECTIVE ACTION:

None. Slowness of homing caused false indication of no homing.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

W. J. M. Chap 9/3/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed
W. J. M. Chap

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/3/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Red EXTRACTION

PROCEDURE SECTION(S) 8.5.4

PROBLEM AND CAUSE:

failure to meet ~~pull~~ ^{17/192} side transfer BACK interlock for pullhead extension. Jrc 9/3/92

See also RLH 29 addressing operating modes. HAND mode was being used to reduce test time due to the difference in operating speeds available. This has no impact upon test validity for this section

SOLUTION/CORRECTIVE ACTION:

Had to clear accountability system of materials from last night. Also found that the Red Compaction System has to be in AUTO mode to enable the SIDE TRANSFER BACK interlock to be met. W 9/3/92

RESOLVE PROGRAM MODE INTERLOCK ISSUE

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN ☒ YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES ☒ NO

APPROVALS

Virgil M. Chap 9/3/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed.
interlock in as per design instructions.
Virgil M. Chap 9/10/92

APPENDIX C-3

MUS 340 REVISED 1280

APPENDIX D-3

NUS 148 REVISED 12M

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/4/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rev Extraction

PROCEDURE SECTION(S) Test 4 Steps 8.5.55 to 8.5.105 (9/3/92)

PROBLEM AND CAUSE:

Testing did not produce data indicative of a constant difference between force gauge indications and control system indications.

- Initial calibration was performed on each jaw individually. This may have produced conversion curves which are not accurate for multiple jaw operations.
- Test gauge set-up may have added error due to rotating moment.
- Speed of force increase may have been too fast.

Unj. M. Chapman 9/4/92

SOLUTION/CORRECTIVE ACTION:

Investigation on 9/4/92 produced data which makes it impractical to perform calibration programming for all factors. No further action will be performed in Phase III.

SEE OITL #261

CLASSIFICATION OF CHANGE

REPAIR ☐ YES ☐ NO ☐

REDESIGN ☒ YES ☐ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

<u>Unj. M. Chapman</u>	9/4/92 (1)(2)
TEST ENGINEER	DATE
<u>C. J. Kelly</u>	9/10/92 (2)
QUALITY ASSURANCE	DATE
<u>F. M. Galle</u>	9/10/92 (2)
PROJECT ENGINEER	DATE
<u>[Signature]</u>	9/10/92 (2)
TEST DIRECTOR	DATE

- Notes: (1) Required for repair
(2) Required for redesign

Completed See OITL #261
UN Chapman 9/10/92

Pull Head Drive B M-107B

- 8.5.55 Retract PULL HEAD DRIVE A M-107A toward the East end-of-travel for clearance.
- 8.5.56 Extend PULL HEAD DRIVE B M-107B towards the West end-of-travel for convenience of test set-up.
- 8.5.57 Record the initial gripper-OPEN **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 0 lbs

JAW 2-B M-107H FORCE: 0 lbs

JAW 3-B M-107I FORCE: 0 lbs

JAW 4-B M-107J FORCE: 0 lbs

Pull Head Drive B Northernmost Pulling Force Load Cell

8.5.58 Insert the test rod and force gauge in alignment with the northernmost pull head drive load cell for a nominal 1/2 inch grip.

8.5.59 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.

8.5.60 Close the gripper JAWS for PULL HEAD DRIVE B M-107B.

8.5.61 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 0.7 lbs

JAW 2-B M-107H FORCE: 2.0 lbs

JAW 3-B M-107I FORCE: 1.0 lbs

JAW 4-B M-107J FORCE: 0.0 lbs

8.5.62 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: 0

Type of Measuring Device: FORCE GAUGE Range: ± 200 lbs

ID Number: 5-41 Calibration Due Date: 10/16/92

8.5.63 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, retract the drive until a force of ~~140~~ ¹⁰⁰ to 200 lbs is indicated on the force gauge.

PCN 7
9/11/92

8.5.64 Record the loaded Force Gauge indication:

FORCE GAUGE LOAD INDICATION: 139 lbs

8.5.65 Record the extraction **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 202 lbs

JAW 2-B M-107H FORCE: 42 lbs

JAW 3-B M-107I FORCE: 35 lbs

JAW 4-B M-107J FORCE: 21 lbs

RL #31
4/14/92

8.5.66 Take a photograph of the test set-up under load.

PHOTO: Rel 11 15 #16

- 8.5.67 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.68 Open the PULL HEAD DRIVE B M-107B gripper JAWS.
- 8.5.69 Remove the test rod and force gauge from the pull head gripper jaws.

<u>Note</u>	<u>Ø Lead</u>
Jaw 1B	27.5
2B	10.7
3B	8.4
4B	9.8

Pull Head Drive B North-Center Pulling Force Load Cell

8.5.70 Insert the test rod and force gauge in alignment with the north-center pull head drive load cell for a nominal 1/2 inch grip.

8.5.71 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.

8.5.72 Close the gripper JAWS for PULL HEAD DRIVE B M-107B.

8.5.73 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 27.6 lbs

JAW 2-B M-107H FORCE: 10.7 lbs

JAW 3-B M-107I FORCE: 8.4 lbs

JAW 4-B M-107J FORCE: 9.2 lbs

8.5.74 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: 0

Type of Measuring Device: FORCE GAUGE Range: ±200 lbs

ID Number: S-41 Calibration Due Date: 10/16/92

8.5.75 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, retract the drive until a force of 140 to 200 lbs is indicated on the force gauge. TPCN 7
11/1/92

8.5.76 Record the loaded Force Gauge indication:

FORCE GAUGE LOAD INDICATION: 16

8.5.77 Record the extraction **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 43.6 lbs

JAW 2-B M-107H FORCE: 70.8 lbs

JAW 3-B M-107I FORCE: 31.9 lbs

JAW 4-B M-107J FORCE: 18.5 lbs 12LH31
11/1/92

8.5.78 Take a photograph of the test set-up under load.

PHOTO: R-1115
#16

- 8.5.79 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.80 Open the PULL HEAD DRIVE B M-107B gripper JAWS.
- 8.5.81 Remove the test rod and force gauge from the pull head gripper jaws.

Note	<u>Ø Lead</u>
Jaw 18	20.6
20	11.4
28	10.6
48	12.6

Pull Head Drive B South-Center Pulling Force Load Cell

- 8.5.82 Insert the test rod and force gauge in alignment with the South-center pull head drive load cell for a nominal 1/2 inch grip.
- 8.5.83 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.
- 8.5.84 Close the gripper JAWS for PULL HEAD DRIVE B M-107B.
- 8.5.85 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 30.6 lbs

JAW 2-B M-107H FORCE: 11.4 lbs

JAW 3-B M-107I FORCE: 10.7 lbs

JAW 4-B M-107J FORCE: 12.6 lbs

- 8.5.86 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: 0

Type of Measuring Device: FORCE GAUGE Range: ± 200 lbs

ID Number: 541 Calibration Due Date: 10/16/92

- 8.5.87 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, retract the drive until a force of ~~140~~ ¹⁰⁰ to 200 lbs is indicated on the force gauge. *RC #30 9/14/92*

- 8.5.88 Record the loaded Force Gauge indication: *slipping 205# RC #30 9/14/92*

FORCE GAUGE LOAD INDICATION: 52

- 8.5.89 Record the extraction **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 41.3 lbs

JAW 2-B M-107H FORCE: 8.0 lbs

JAW 3-B M-107I FORCE: 56.3 lbs

JAW 4-B M-107J FORCE: 24.5 lbs

- 8.5.90 Take a photograph of the test set-up under load. *Note: Reel 10 shp RC #30 9/14/92*

PHOTO: Reel 1115 2/16

- 8.5.91 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.92 Open the PULL HEAD DRIVE B M-107B gripper JAWS.
- 8.5.93 Remove the test rod and force gauge from the pull head gripper jaws.

<u>Note</u>	<u>Load</u>
Jaw 17	12.2
28	0.7
37	15.2
48	6.3

Pull Head Drive B Southernmost Pulling Force Load Cell

8.5.94 Insert the test rod and force gauge in alignment with the Southernmost pull head drive load cell for a nominal 1/2 inch grip.

8.5.95 Insert sixteen dummy test rods (studs) in the remaining gripper positions for a nominal 1/2 inch grip.

8.5.96 Close the gripper JAWS for PULL HEAD DRIVE B M-107B.

8.5.97 Record the initial gripper-CLOSE **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 38.7 lbs

JAW 2-B M-107H FORCE: 0.7 lbs

JAW 3-B M-107I FORCE: 15.2 lbs

JAW 4-B M-107J FORCE: 6.3 lbs

8.5.98 Record the initial Force Gauge indication:

FORCE GAUGE NO-LOAD INDICATION: 0

Type of Measuring Device: FORCE GAUGE Range: ± 200 lbs

ID Number: 5.41 Calibration Due Date: 10/16/92

8.5.99 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, retract the drive until a force of 140 to 200 lbs is indicated on the force gauge. *100* *TPCN 7*

8.5.100 Record the loaded Force Gauge indication: *slipped n108*

FORCE GAUGE LOAD INDICATION: 70

8.5.101 Record the extraction **FORCE** indications for Pull Head Drive B M-107B.

JAW 1-B M-107G FORCE: 45.9 lbs

JAW 2-B M-107H FORCE: 15.4 lbs

JAW 3-B M-107I FORCE: 9.9 lbs

JAW 4-B M-107J FORCE: 107.0 lbs *RC 471*

8.5.102 Take a photograph of the test set-up under load.

PHOTO: Roll 15

- 8.5.103 Operating PULL HEAD DRIVE B M-107B in the JOG Mode, extend the drive until the no-load is indicated on the force gauge.
- 8.5.104 Open the PULL HEAD DRIVE B M-107B gripper JAWS.
- 8.5.105 Remove the test rod and force gauge from the pull head gripper jaws.

<u>Note</u>	<u>Load</u>
Jaw 18	40.5
28	.6
38	13.6
48	24.6

Pages 39-47
Data collected 9/3/92

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

^{9/8/92}
EXCEPTION / REPAIR LOG

DATE 9/8/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rio Extraction

PROCEDURE SECTION(S) _____

PROBLEM AND CAUSE:

The proximity sensor cable connector on Pull Head Drive A was damaged on 9/4/92. In the extension of the pull head, a piece of unistrut temporarily left on top of the framework was struck and the electrical connector broken.

SOLUTION/CORRECTIVE ACTION:

Connector is now held in place temporarily by tie wraps. This is sufficient for testing purposes at this time.

CLASSIFICATION OF CHANGE

REPAIR ☒ YES _____ NO _____

REDESIGN _____ YES _____ NO _____

REVISION TO ORIGINAL PROCEDURE REQUIRED _____ YES _____ NO

APPROVALS

Usiel M. Echar 9/8/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed. See OITL # 258

Usiel M. Echar 9/10/92

TEST PROCEDURE

9315-TP-201

REVISION 0

APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/8/92

PROCEDURE NO. 9315-TIP-201 REV. 0 TITLE Red Extraction

PROCEDURE SECTION(S) TPCN 4 step 8.3.45

PROBLEM AND CAUSE:

Single mode sequence failed to progress to the 3rd hold print upon actuation of continue. No apparent cause. The system just did not respond. When taken to the OFF mode and returned to Single mode, the machine faulted on interlock to move forward, not Back.

SOLUTION/CORRECTIVE ACTION:

Repeat testing to verify/debug sequence operations.

Testing performed on 9/2/92 demonstrated that the sequencing progressed as expected. No unusual observations were made. The cause of the initial problem is not known. - 9/11/92

CLASSIFICATION OF CHANGE

REPAIR _____ YES _____ NO _____

REDESIGN _____ YES _____ NO _____

REVISION TO ORIGINAL PROCEDURE REQUIRED ____ YES ____ NO

APPROVALS

Naresh N. Phadnis 9/10/91 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE _____ DATE _____ (2)

PROJECT ENGINEER _____ DATE _____ (2)

TEST DIRECTOR _____ DATE _____ (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed
Vigil UChen 9/10/92

8.3 AUTO MODE SEQUENCE AND CCTV CAMERA TESTING

NOTE

Initial testing as per Section 8.1.6.1 for SINGLE mode operations and as per Section 8.1.6.2 for AUTO mode operations verified the operation of the sequence. However, CALL CAMERA operations were performed with Camera 4 and the coverage criteria were not fully demonstrated. Camera call operations are reprogrammed to provide adequate coverage. This test demonstrates operations with CCTV Camera 3 and 7 for the first two rod extraction hold points and with Cameras 4 and 8 for the rod-released hold point. Coverage criteria are revised to reflect function as per TAC Change Notice 001.

- 8.3.1✓ Ensure that the Rod Extraction System has been restored following JOG Mode operations.
- 8.3.2✓ Ensure that the CCTV System is in service and set-up for this testing.
- 8.3.3✓ Simulate the presence of fuel as required to enable programmed mode operations. Place other interfacing systems in the required operating modes. Record such activities in the Daily Test Log.
- 8.3.4✓ Set up image sources for the Clamping Table's Upper and Lower Clamps. Such a set-up should represent W 17 X 17 rods.
- . At the lower clamps, arrange the image source to represent rods pulled approximately one inch. Triangular stacks of three 3/8" studs with the top stud off-set by one inch is recommended.
 - . At the upper clamp, arrange the full-length rod image source to represent rods not pulled. Place one test rod in each fuel assembly position but do not actuate the load-cells. Position it such that it cannot be gripped.
 - . Photograph the test setup.

PHOTO: 2.11.1#1²

NOTE

Operations in the SINGLE Mode are identical to AUTO mode operations with the exception that sequential servo-motor operations must be enabled. It is semi-automatic rather than automatic. Only SINGLE Mode operations are performed in this testing.

- 8.3.5 ✓ Position the Pull Head Drives A M-107A and B M-107B in the BACK position with all grippers open.

NOTE

Operate the Clamping Table as required to support this Pull Head Drive testing.

- 8.3.6 ✓ Place the Rod Extraction System in the SINGLE Mode.

Pull Head Drive Extension

NOTE

Monitor operations on the ROD EXTRACTION A control screen. The following timing should be based on control system indications.

- 8.3.7 Initiate the sequence. At the **EXTEND PULL HEADS** operating message, start timing.
- 8.3.8 Observe that the Pull Head Drives M-107A and M-107B extend and that the gripper JAWS close. Stop timing.
- 8.3.9 Note the elapsed time: 1 Min 24.5 Sec
- 8.3.10 Photograph the extended pull heads.

PHOTO: Rg115 #11

- 8.3.11 Record, for information only, the pull head drive position indications.

PULL HEAD DRIVE A M-107A: .299 inches

PULL HEAD DRIVE B M-107B: .299 inches

- 8.3.12 Identify a "0" reference point for the use of collecting pull head drive extraction travel measurements.

Verify Pulling Operation Hold Point

- 8.3.13 Actuate **CONTINUE** and start timing.
- 8.3.14 Observe that the Pull Head Drives M-107A and M-107B retract to the first hold point position. Stop timing.
- 8.3.15 Note the elapsed time: 6.45sec
- 8.3.16 Observe that the **VERIFY PULLING OPERATION** Hold Point is presented. Start timing.
- 8.3.17 Actuate **ALARM ACK** on the Rod Extraction A Control Screen.
- 8.3.18 Actuate **CALL CAMERA** on the Rod Extraction A control screen.
- 8.3.19 Observe that CCTV Cameras 3 and 7 are displayed on the console monitors. Adjust as required to obtain image source display.
- 8.3.20 Simulate, but do not actuate, **CONTINUE** on the Rod Extraction A Control screen.
- 8.3.21 Stop timing, note the elapsed time: 1min 10sec

NOTE

The first hold point is currently set at 1 inch. This can be increased up to 2 inches if required to get a better display. If the setpoint is adjusted, enter the appropriate entries in the Daily Test Log recording the new setpoint and perform a retest as per this section AND as per Section 8.1.2 of the original test procedure. Attach any retests as per this TPCN to this TPCN.

ATTACHMENT: _____

ATTACHMENT: _____

- 8.3.22 Record, for information only, the pull head drive position indications.

PULL HEAD DRIVE A M-107A: 1.462 inchesPULL HEAD DRIVE B M-107B: 1.463 inches

8.3.23 Record the extraction travel of the pull heads for information only using a tape measure.

PULL HEAD A TRAVEL TO 1st HOLD POINT: 7 1/2 inches }
PULL HEAD B TRAVEL TO 1st HOLD POINT: 1.0 inches } 21 #35
9/8/92

8.3.24 Verify that the image source is displayed and that

- . The lower clamp image indicates that the rod is partially pulled.
- . The Upper Clamp image indicates that a rod has not been pulled.

Virgil M. Chapman 9/8/92
Test Conductor Date

8.3.25 Complete a CCTV Assessment Form, Appendix E.

ATTACHMENT: 6 5 7

8.3.26 Acceptance Criteria

- . Video images from Cameras No. 3 and 7 are displayed on the console monitors when CALL CAMERA is actuated at the VERIFY PULLING OPERATION Hold Point.
- . Both cameras can be positioned to verify the partial extraction of rods.

Virgil M. Chapman 9/8/92
Test Conductor Date
[Signature] 9/8/92
Date

Enter # of Rods Remaining Hold Point

- 8.3.27 Actuate CONTINUE and start timing.
- 8.3.28 Observe that the Pull Head Drives M-107A and M-107B retract to the second hold point position. Stop timing.

NOTE

The Hold Point alarm may be acknowledged now for convenience.

- 8.3.29 Note the elapsed time: 3 min 25 sec.
- 8.3.30 Did both drives start and stop at the same time?
Yes
- 8.3.31 Were drive operations smooth and continuous with speed acceleration at the start and speed deceleration at the end?

Yes However, pull head drive speed was slow.

NOTE

This elapsed extraction time represents the initial time measurement for use in the evaluation of the extraction speed criteria. The extraction pull from the first hold point is expected to occur in ≤ 0.97 minutes at an average speed of ≥ 181 ipm. Due to acceleration and deceleration ramps, the actual extraction speed setpoint may have to be increased to meet the time criteria.

- 8.3.32 Calculate the average Pull Head Drive speed (for information only) as

(175 inches)(60 sec/min)/(elapsed time)

*RL 474
4/12/92*
= ~55.9 ipm

- 8.3.33 Observe that the **ENTER # OF RODS REMAINING IN ROW** Hold Point is presented. Start timing.
- 8.3.34 Actuate **ALARM ACK** on the Rod Extraction A Control Screen.
- 8.3.35 Actuate **CALL CAMERA** on the Rod Extraction A control screen.
- 8.3.36 Observe that CCTV Cameras 3 and 7 are displayed on the console monitors. Adjust as required to obtain image source display. Look at the displays to see the test rods.
- 8.3.37 Enter "0" at the Rod Extraction A Control Screen's **KEYBOARD INPUT**.
- 8.3.38 Simulate, but do not actuate, **CONTINUE** on the Rod Extraction A control screen.
- 8.3.39 Stop timing, note the elapsed time: 1 MIN 58 SEC
- 8.3.40 Verify that the image source is displayed and that the full length test rod in each fuel assembly position is visible.

Vincent M. Chapman
Test Conductor

9/10/92
Date

- 8.3.41 Record, for information only, the pull head drive position indications.

PULL HEAD DRIVE A M-107A: 176.318 inches

PULL HEAD DRIVE B M-107B: 176.318 inches

- 8.3.42 Record the extraction travel of the pull heads for information only using a tape measure.

PULL HEAD A TRAVEL TO 2nd HOLD POINT: 175 1/4 inches

PULL HEAD B TRAVEL TO 2nd HOLD POINT: 174 7/8 inches

} *RL 475
4/12/92*

- 8.3.43 Complete a CCTV Assessment Form, Appendix E.

ATTACHMENT: 8-9

8.3.44 Acceptance Criteria

- . Video images from Cameras No. 3 and 7 are displayed on the console monitors when CALL CAMERA is actuated at the ENTER # OF RODS REMAINING Hold Point.
- . Both cameras can be positioned to verify that all rods in the row were extracted or to count the number of rods remaining in the row.

<u>David M. Chan</u>	<u>9/8/92</u>
Test Conductor	Date
<u>Peter V. Juhl</u>	<u>9/8/92</u>
QA	Date

Verify Pulling Clear Hold Point

NOTE

The following timing should be based on control system indications.

- 8.3.45 Actuate **CONTINUE** and start timing.
- 8.3.46 Observe that the Pull Head Drives M-107A and M-107B retract to the drop rods position and that the gripper JAWS open. Stop timing.
- 8.3.47 Note the elapsed time: _____

NOTE

The actuation of the **OFF** mode below is to represent the actuation of **CONTINUE** in the normal process.

- 8.3.48 Observe that the **VERIFY PULLING CLEAR** Hold Point is presented. Start timing.
- 8.3.49 Actuate **ALARM ACK** on the Rod Extraction A Control Screen.
- 8.3.50 Actuate **CALL CAMERA** on the Rod Extraction A control screen.
- 8.3.51 Observe that CCTV Cameras 4 and 8 are displayed on the console monitors. Look at Camera 8's display to see if any rods are there.
- 8.3.52 Actuate the **OFF** Mode on the Rod Extraction A control screen.
- 8.3.53 Stop timing, note the elapsed time: _____
- 8.3.54 Complete CCTV Assessment Forms, Appendix E for Cameras 4 and 8.

ATTACHMENT: _____

- 8.3.55 Record, for information only, the pull head drive position indications.

PULL HEAD DRIVE A M-107A: _____ inches

PULL HEAD DRIVE B M-107B: _____ inches

8.3.56 Record the extraction travel of the pull heads for information only using a tape measure.

PULL HEAD A TRAVEL TO 3rd HOLD POINT: 3 7/8" inches

PULL HEAD B TRAVEL TO 3rd HOLD POINT: 4 1/8" inches

} RLB35
VMS
not 9/14/12

8.3.57 Acceptance Criteria

- . Video images from Cameras No. 4 and 8 are displayed on the console monitors when CALL CAMERA is actuated at the VERIFY PULLING CLEAR Hold Point.
- . Camera 8 provides a view of the jaw/fuel rod interface sufficient to determine that all rods are released.

Test Conductor Date

QA Date

NOTE

The following evaluates whether or not the RBT's cameras 9 and 10 are useful to evaluate rod release from the grippers.

8.3.58 Operating the RBT in the JOG Mode, position it such that CCTV Cameras 9 and 10 can be used, in conjunction with stationary CCTV Camera 4 to investigate if it can verify that all rods are released from the grippers.

8.3.59 Complete a CCTV Assessment Form, Appendix E.

ATTACHMENT: _____

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

^{09/14/92}
EXCEPTION / REPAIR LOG

DATE 9/10/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE ROD EXTRACTION

PROCEDURE SECTION(S) IDCN 4 Step 2.3.32

PROBLEM AND CAUSE:

Temporary speed setpoints were not programmed for Rod Extraction System Pull Head Driner.
Pull Head Extend 21,133 cps
Pull Head Retract 21,133 cps
Jog Speed 5,000 cps

SOLUTION/CORRECTIVE ACTION:

Program speed setpoints and issue DCN.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN ✓ YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

<u>[Signature]</u>	<u>9/10/92</u> (1) (2)
TEST ENGINEER	DATE
<u>[Signature]</u>	<u>9/10/92</u> (2)
QUALITY ASSURANCE	DATE
<u>[Signature]</u>	<u>9/10/92</u> (2)
PROJECT ENGINEER	DATE
<u>[Signature]</u>	<u>9/10/92</u> (2)
TEST DIRECTOR	DATE

Notes: (1) Required for repair
(2) Required for redesign

Completed
DCN 444 Approved
VN Chapman 9/25/92

EXCEPTION / REPAIR LOG

PROCEDURE SECTION(S) 9.3

Physical measurement data was collected on 9/1/92

No action required Explanation

REVISION TO ORIGINAL PROCEDURE REQUIRED _____ YES _____ NO

TEST DIRECTOR _____ DATE _____ (2)

Completed
N.N. Chapp 4/4/52

EXCEPTION / REPAIR LOG

PROCEDURE SECTION(S) g.3

Due to selected Red Extraction restore sequence, Red Compaction carriage extended/retracted at south end of travel, carriage contacted gate with a thud

Copy provided to Test Conductor Lu, TP 207

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

11/24/92
EXCEPTION / REPAIR LOG

DATE 9/19/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rod EXTRACTION

PROCEDURE SECTION(S) TPCN 4 Step 8.3.19

PROBLEM AND CAUSE:

1st Rod Extraction hold point Call Camera produced cameras 4:7, not 3:7.

SOLUTION/CORRECTIVE ACTION:

Test Conductor actuated the alarm block's CALL CAMERA, not the HOLD/MESSAGE block's call camera. It does make a difference.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES ☒ NO

APPROVALS

Nigel M. Elmer 9/10/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
(2) Required for redesign

Completed.
Operating procedure writer will update procedures accordingly.

Nigel M. Elmer 9/10/92

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/9/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rod Extraction

PROCEDURE SECTION(S) TDCN4 steps 8.7.6 & 8.7.35.

PROBLEM AND CAUSE:

The design interior length is 1/2". TDCN4 required 3/8 to 5/8". Actual interior length was 0.7265" by calculation.

The final positioning setpoint of 1" East of the East end of the Clamping Table is not readily measured. Measurement methods used in equipment set-up and TDCN4 testing may have varied by an estimated 1/16" or more.

The Rod Extraction extend pull heads setpoint is incorrect for the measurements made today. Rather than 1.164 inches of travel, 0.9375 inches from the first hold point to the grip neck position would be required. The setpoint maybe should be 0.525 inches rather than 0.297 inches. However, the observed 0.7265" is functionally adequate since the grippers allow 7/4" for the 1/2" design value. See also R1 #40. *David McChap 9/9/92*

SOLUTION/CORRECTIVE ACTION:

No action is required. Set-up used 1" from the inside of the clamping table lip. This accounts for the ~1/4" difference.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

David McChap 9/10/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed
David McChap 9/10/92

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX 0-3

EXCEPTION / REPAIR LOG

DATE 9/9/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rod EXTRACTION

PROCEDURE SECTION(S) TPCN 4 Steps 8.7. 14:43

PROBLEM AND CAUSE:

The test set-up used in testing on 9/9/92 did not produce test rod alignment with the gripper. Some rods had to be manually guided into the gripper. The test set-up did not simulate the W17X17 upper grid adequately. VN Chapman 9/9/92

SOLUTION/CORRECTIVE ACTION:

For testing 9/9/92, guide rods into position as required. TPCN 11. VN Chapman 9/9/92
Rod alignment is demonstrated under 9315-TP-202 for W17X17 assemblies. The test set-up used in TPCN 4 testing was not adequate to insure rod alignment. No further action is required.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

VN Chapman 9/10/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign Completed 9/10/92 VN Chapman

TEST PROCEDURE 9315-TP-201 REVISION APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/9/92

PROCEDURE NO. 9315-TP-201 REV. C TITLE R.O. EXTRACTION

PROCEDURE SECTION(S) TPCN 4 Steps 8.7.20, 49, 11 & 40 also 8.7.17

PROBLEM AND CAUSE:

The inserts in the pull head gripper limit offset to about 1 1/4" rather than 1 1/2" (8.7.11 & 40).
The inserts caused unexpected travel of 1 1/2" offset rods (8.7.20 & 49)
The inserts caused travel of one non. offset rod in Pull Head R's gripper (8.7.17)
Actual available insertion lengths were not measured. The inserts appear to be improperly sized or positioned. This may be also due to measurement difficulties in setting the rods at position / wrong extend heads setpoint. See RA #39. David M. Chap 9/9/92

SOLUTION/CORRECTIVE ACTION:

No action is required. TPCN 4 used a difference reference point than did test setup for initial testing. Fuel assemblies are to be placed on the Clamping Table such that the rods extend East 1" from the inside of the east lip. The 1 1/4" insertion length is acceptable for IRT testing.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

David M. Chap 9/10/92 (1)(2)
TEST ENGINEER DATE
QUALITY ASSURANCE DATE (2)
PROJECT ENGINEER DATE (2)
TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed David M. Chap 9/10/92

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/9/92

PROCEDURE NO. 9315-TIP-201 REV. 0 TITLE Rio Extraction

PROCEDURE SECTION(S) TRCNY Slu 8.7.29

PROBLEM AND CAUSE:

AND CAUSE:
Rods #12-14 failed to drop at the drop rods hold point for Pull Head A. These rods were still inserted about 1 1/4".

It was noted that the rods had been lubricated, probably to prevent rust (by others). The lubrication would tend to resist rod drop with low friction on the Consolidated tube surface at the west end of the rod. However, it would aid with low friction at the East end in the gripper.

Also, the wood in-sinker length inserts may be too short to meet the design goal. The inserts are used in an attempt to compensate for Phase III design developments which did not provide the intended freedom of contact at areas other than the intended gripping surface.

SOLUTION/CORRECTIVE ACTION:

/CORRECTIVE ACTION:
None required for Phase III. IST testing may proceed. Pull heads should be redesigned at a later date.

SEE UTL Item 258

CLASSIFICATION OF CHANGE

REPAIR _____ YES _____ NO _____

REDESIGN YES _____ NO _____

REVISION TO ORIGINAL PROCEDURE REQUIRED ____ YES ____ NO

APPROVALS

David M. Allen 9/10/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE _____ DATE _____ (2)

PROJECT ENGINEER _____ DATE _____ (2)

TEST DIRECTOR _____ DATE _____ (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed
Austin Chan 9/10/12

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/9/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Red Extraction

PROCEDURE SECTION(S) TPCN4 87.20-49

PROBLEM AND CAUSE:

TAC 201 requires that the gripper accommodate rods with both 1 1/2" offset and bend. TPCN4 acceptance criteria also require offset & bend. The test set-up used in testing did not represent howing as would be found in a field assembly.

David McPherson 9/9/92

SOLUTION/CORRECTIVE ACTION:

No further action is required. Bowed rods were adequately demonstrated in initial testing.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES ☒ NO

APPROVALS

TEST ENGINEER 9/10/92 (1)(2)
DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed
David McPherson 9/10/92

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/19/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE Rod Extraction

PROCEDURE SECTION(S) TPCNY Steps 27-25-51

PROBLEM AND CAUSE:

As rods were withdrawn from the clamping table, they were observed to drop on electrical components located at the East end of the table. Direct contact from W17 X17 in an assembly is unlikely, but a glancing contact is likely. Other fuel types may produce direct contact depending on the location of the east end grid.
WChap 9/19/92

SOLUTION/CORRECTIVE ACTION:

Problem to be resolved in later phase.

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

W. J. Chapman 9/11/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for repair
(2) Required for redesign

Completed
See CITE # 262
W. J. Chapman

TEST PROCEDURE 9315-TP-201 REVISION 0 APPENDIX D-3

11/24/92
EXCEPTION / REPAIR LOG

DATE 9/10/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE RVD EXTRACTION

PROCEDURE SECTION(S) TRENCH Steps 8.3.4.6 & 47

PROBLEM AND CAUSE:

Gripper opening time was not directly obtained due to sequence operation in SINGLE mode being different than anticipated.

SOLUTION/CORRECTIVE ACTION:

Rather than retest, use estimated time for basis of calculations in Section 8.4.
Use 36.5 Sec as the approximate gripper operating time in the AUTO Mode

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES ☒ NO

APPROVALS

David H. Chapman 9/10/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
(2) Required for redesign

Completed - See Test Log
D.H. Chapman 9/10/92

APPENDIX D-3

EXCEPTION / REPAIR LOG

DATE 9/10/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE RIO EXTRACTION

PROCEDURE SECTION(S) TRCN 4 Step 83.7

PROBLEM AND CAUSE:

AND CAUSE:
The test procedure was prepared assuming that the action message in the single mode followed the single mode pause. The actual sequence is that the message is displayed, then the pause message is displayed. This is a more desirable sequence.

SOLUTION/CORRECTIVE ACTION:

TPCN 13 to correct Step 2.3.7 wording to reflect actual operation

CLASSIFICATION OF CHANGE

REPAIR YES NO

REDESIGN _____ YES _____ NO _____

REVISION TO ORIGINAL PROCEDURE REQUIRED ____ YES ✓ NO

APPROVALS

TEST ENGINEER DATE 9/10/94 (1)(2)

QUALITY ASSURANCE _____ DATE _____ (2)

PROJECT ENGINEER _____ DATE _____ (2)

TEST DIRECTOR _____ DATE _____ (2)

Notes: (1) Required for repair
(2) Required for redesign

Edward M. Egan 4/10/92

TEST PROCEDURE 9315-TP-201

REVISION 0

APPENDIX D-3

EXCEPTION / ^{FINAL} REPAIR LOG

DATE 9/10/92

PROCEDURE NO. 9315-TP-201 REV. 0 TITLE R.D. EXTRACTION

PROCEDURE SECTION(S) IPCN 4 Step 8.3.9 & 8.3.57

PROBLEM AND CAUSE:

The design intent was to provide two cameras which provide coverage at each hold point. (Phase II Final Design Report, Page 2-318 of Vol 1). Two cameras (4 and 8) are presented at the Red Extraction VERIFY during CLEAR Hold Point. Only Camera 8 provides coverage adequate to verify that all rods are released. Cameras 4 and 9 can provide some backup coverage.

SOLUTION/CORRECTIVE ACTION:

No corrective action is required for Phase III. Camera 8 provides adequate coverage for integrated system testing.

CLASSIFICATION OF CHANGE

REPAIR ☐ YES ☐ NO ☐REDESIGN ☐ YES ☐ NO ☐REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

David M. Chapman 9/10/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for repair
(2) Required for redesign

Completed. See OIR #259
David M. Chapman 9/10/92

APPENDIX O-3

EXCEPTION / REPAIR LOG

DATE 9/10/92

PROCEDURE NO. 9315-T12-2.11 REV. 0 TITLE RUB EXTRACTOR

PROCEDURE SECTION(S) TPC N 4 step 8.3.57

PROBLEM AND CAUSE:

CCTV Camera 2 provides coverage adequate to verify that all reds are released at the Red Extraction Systems drop reds hold point.

However, visual coverage is limited by the presence of a proximity sensor support. Certain gripper TAWs for pull head M607B cannot be seen.

RESOLUTION/CORRECTIVE ACTION:

for the new facility, relocate CCTV Camera 8 for full visual coverage on recess proximity sensor support

CLASSIFICATION OF CHANGE

REPAIR YES NO REDESIGN YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES ☒ NO

APPROVALS

TEST ENGINEER 9/10/92 (1)(2)
DATE

QUALITY ASSURANCE _____ DATE _____ (2)

PROJECT ENGINEER _____ DATE _____ (2)

TEST DIRECTOR _____ DATE _____ (2)

otes: (1) Required for repair
(2) Required for redesign

Completed. See OITC # 257

Vasil M. Ochev 9/10/42

TEST PROCEDURE

9315-TP-201

REVISION

0

PAGE

F-1

APPENDIX F
TRAINING SIGN-OFF SHEET

NAME (Print)

SIGNATURE

T. E. MCKENNA

K. T. GUNNARSSON

E. B. FORREST

V. W. Chapman

Gordon J. Cole

G. JEAN-PHILIPPE

[Signature]

[Signature]

[Signature]

[Signature] 8/7/92

[Signature]

[Signature]

CLIENT:	FILE NO.:	BY:	PAGE OF
SUBJECT:	CHECKED BY:		DATE:

ATTACHMENTS

1. 8.1.5 Motor Drive Data (initial)
2. 8.1.5 MCS Table of Speeds/positions
3. 8.1.5 Controller Sensor Parameters for Red Extraction System
4. TPCUD Section for Step 8.1-7.
5. Directory of c:\MCC\CONWUS
6. CCTV Assessment
7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
16. Photo log
17. OITL input sheets
18. " " "
19. OITL list 9/25/92
20. TAC CHANGE NOTICE TCN-001

TOTAL MCS = 87

Primary Task MCS = 50L2

Restore MCS = +B(30)

MCSL ID = 10

HEAD EXTEND SPEED ²⁵⁰⁰⁰~~2330~~ CTS/SEC } For 15X15
 HEAD RETRACT SPEED ¹⁰⁰⁰⁰~~7783~~ CTS/SEC } Wt
 012/92

Superseded by
 Attachment
 23. VNC
 8/11/92

CLAMPING TABLE & ROD EXTRACTION MOTOR SETTINGS (PCC-13F, ID-10)

PARAM	Axis 1 M-107A	Axis 2 M-107B	Axis 3 M-106I	Axis 4
RPG	18	18	40 40	20
RIG	150	150	250	150
ATC	236	236	98	30
PCL	100 100	100	100	60
ACL	40	40	50	40
PTB	20	20	40	20
ACC	50000	50000	20000	20000
DEC	50000	50000	20000	0
RES	1000	1000	1000	1000
NWP	6	6	6	6
FEL	500000	500000	100000	32000
CWL	0	0	0	0
CCL	0	0	0	0
STB	500	500	500	500
BSP	3600	3600	3600	3600
RPR	0	0	0	0
HOF	1000	1000 4200	1000	0
JSP	31133	31133	20333 16000 (9962PM)	0
HSP	1000	1000 4500	1000	0
FDR	0	0	0	0
HDR	-1000	-500	-1000	0

Table Listing

0:(0)	1000	TEST SPEED
1:(1)	21113	HEAD EXTEND
2:(2)	21113	HEAD RETRACT
3:(3)	10000	SLIDER POSITION
4:(4)	10000	LOWER TAB POSITION

Table Listing

0:(0)	000
1:(1)	044
2:(2)	43934
3:(3)	43940
4:(4)	43834
5:(5)	43834
6:(6)	41871
7:(7)	41871
8:(8)	41910

5,000 v 9/25/92 5,000 v 9/25/92

Control Panel - Service - Administrative Services

8.6 Camera Functional Verifications

NOTE

The following testing verifies that the CCTV Subsystem camera optional features function as per the design;

- . Pan, nominally 355 degrees,
- . Tilt, nominally 180 degrees,
- . Lens focus,
- . Optical focus,
- . Iris,
- . Zoom, and/or
- . Spotlights,

where provided, operate as per Test Acceptance Criteria 1.2-1.

Also demonstrated is that each Operator Control Console # 1 and # 2 has the capability to control the features for the assigned camera.

Also included is the adjustment of the local CCTV Camera lighting intensity Variac transformers for the selection of "dim" lighting.

Also included is the setting of pan and/or tilt stops for unavoidable interferences in the installation, if required.

~~8.6.1 Verify that Detailed Test Step Sections 8.1 to 8.5 have been completed.~~

~~8.6.2 Verify that Equipment Setup Section 1.6 in Appendix A has been completed.~~

Testing of TP 600 as per 9315-TP-201, PCN 4, Step 8.1.7

~~8.6.58 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual and turn off the spotlight.~~

Acceptance Criteria

- ~~• CCTV Camera # 2's spotlight illuminates and extinguishes in response to the camera controls from OCC-1.~~
- ~~• CCTV Camera # 2's spotlight illuminates at bright and dim intensity in response to the camera controls at OCC-1.~~
- ~~• CCTV Camera # 2's variac control operates to change the level of the spotlight's illumination.~~
- ~~• CCTV Camera # 2's IRIS control operates to open and close the camera's iris from OCC-1.~~
- ~~• CCTV Camera # 2's OPTICAL FOCUS Focus control operates to obtain focus from OCC-1.~~
- ~~• CCTV Camera # 2's LENS FOCUS Focus control operates to obtain focus from OCC-1.~~

Test Conductor _____ Date _____

QA _____ Date _____

- 8.6.59 Place CCTV Camera # 3 in service for testing from OCC-1 with an identifiable visual object or target in the field of view.
- 8.6.60 At Operator Control Console # 1, select CCTV Camera # 3 for display on either console monitor.
- 8.6.61 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.
- 8.6.62 Operate the console's CTX-800 IRIS switch in the OPEN position to observe a detectable increase in lighting intensity on the selected monitor.

- 8.6.63 Operate the console's CTX-800 IRIS switch in the CLOSE position to observe a detectable decrease in lighting intensity on the selected monitor.
- 8.6.64 Operate the console's CTX-800 IRIS switch to obtain a well contrasted image on the selected monitor.
- 8.6.65 Select the LENS FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.66 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.67 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.68 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.
- 8.6.69 Select the OPTICAL FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.70 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.71 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.72 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.
- 8.6.73 Operate the console's CTX-800 ZOOM switch in the IN position to obtain a zoomed-in display. Use focus and/or iris control as required to obtain a clear display on the monitor.
- 8.6.74 Operate the console's CTX-800 ZOOM switch in the OUT position to obtain a zoomed-out display. Use focus and/or iris control as required to obtain a clear display on the monitor.

- 8.6.75 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.

~~Acceptance Criteria~~

- . CCTV Camera # 3's IRIS control operates to open and close the camera's iris from OCC-1.
- . CCTV Camera # 3's LENS FOCUS Focus control operates to obtain near and far focus from OCC-1.
- . CCTV Camera # 3's OPTICAL FOCUS Focus control operates to obtain near and far focus from OCC-1.
- . CCTV Camera # 3's ZOOM control operates to obtain zoomed-in and zoomed-out images from OCC-1. Zoomed images may adjusted for clarity.

Test Conductor

David M. Che

Date 9/8/92

QA

Date

- 8.6.76 Place CCTV Camera # 3 in service for testing from OCC-2 with an identifiable visual object or target in the field of view.
- 8.6.77 At Operator Control Console # 2, select CCTV Camera # 3 for display on either console monitor.
- 8.6.78 Select the OCC-2 CTX-800 manual mode for iris control as per the vendor's manual.
- 8.6.79 Operate the console's CTX-800 IRIS switch in the OPEN position to observe a detectable increase in lighting intensity on the selected monitor.
- 8.6.80 Operate the console's CTX-800 IRIS switch in the CLOSE position to observe a detectable decrease in lighting intensity on the selected monitor.
- 8.6.81 Operate the console's CTX-800 IRIS switch to obtain a well contrasted image on the selected monitor.

~~8.6.92 Select the OCC-2 CTX-800 manual mode for iris control as per the vendor's manual.~~

Acceptance Criteria

- ~~. CCTV Camera # 3's IRIS control operates to open and close the camera's iris from OCC-2.~~
- ~~. CCTV Camera # 3's LENS FOCUS Focus control operates to obtain near and far focus from OCC-2.~~
- ~~. CCTV Camera # 3's OPTICAL FOCUS Focus control operates to obtain near and far focus from OCC-2.~~
- ~~. CCTV Camera # 3's ZOOM control operates to obtain zoomed-in and zoomed-out images from OCC-3. Zoomed images may adjusted for clarity.~~

~~Test Conductor _____ Date _____~~

~~QA _____ Date _____~~

8.6.93 Place CCTV Camera # 4 in service for testing with an identifiable visual object or target in the field of view.

8.6.94 At Operator Control Console # 1, select CCTV Camera # 4 for display on either console monitor.

8.6.95 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.

8.6.96 STEP NOT USED

8.6.97 Operate the console's CTX-800 IRIS switch in the OPEN position to observe a detectable increase in lighting intensity on the selected monitor.

8.6.98 Operate the console's CTX-800 IRIS switch in the CLOSE position to observe a detectable decrease in lighting intensity on the selected monitor.

8.6.99 Operate the console's CTX-800 IRIS switch to obtain a well contrasted image on the selected monitor.

- 8.6.100 Select the LENS FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.101 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.102 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.103 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.
- 8.6.104 Select the OPTICAL FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.105 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.106 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.107 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.
- 8.6.108 Operate the console's CTX-800 ZOOM switch in the IN position to obtain a zoomed-in display. Use focus and/or iris control as required to obtain a clear display on the monitor.
- 8.6.109 Operate the console's CTX-800 ZOOM switch in the OUT position to obtain a zoomed-out display. Use focus and/or iris control as required to obtain a clear display on the monitor.

- 8.6.110 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.

~~Acceptance Criteria~~

- . CCTV Camera # 4's IRIS control operates to open and close the camera's iris from OCC-1.
- . CCTV Camera # 4's LENS FOCUS Focus control operates to obtain near and far focus from OCC-1.
- . CCTV Camera # 4's OPTICAL FOCUS Focus control operates to obtain near and far focus from OCC-1.
- . CCTV Camera # 4's ZOOM control operates to obtain zoomed-in and zoomed-out images from OCC-1. Zoomed images may adjusted for clarity.

Test Conductor

David M. Chen

Date *9/2/92*

QA

Date

- 8.6.111 Place CCTV Camera # 5 in service for testing with an identifiable visual object or target in the field of view.
- 8.6.112 At Operator Control Console # 1, select CCTV Camera # 5 for display on either console monitor.
- 8.6.113 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.
- 8.6.114 Operate the console's CTX-800 IRIS switch in the OPEN position to observe a detectable increase in lighting intensity on the selected monitor.
- 8.6.115 Operate the console's CTX-800 IRIS switch in the CLOSE position to observe a detectable decrease in lighting intensity on the selected monitor.
- 8.6.116 Operate the console's CTX-800 IRIS switch to obtain a well contrasted image on the selected monitor.

~~8.6.138 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.~~

~~Acceptance Criteria~~

- ~~• CCTV Camera # 6's IRIS control operates to open and close the camera's iris from OCC-1.~~
- ~~• CCTV Camera # 6's OPTICAL FOCUS Focus control operates to obtain focus from OCC-1.~~
- ~~• CCTV Camera # 6's LENS FOCUS Focus control operates to obtain focus from OCC-1.~~

~~Test Conductor _____ Date _____~~

~~QA _____ Date _____~~

- 8.6.139 Place CCTV Camera # 7 in service for testing with an identifiable visual object or target in the field of view.
- 8.6.140 At Operator Control Console # 1, select CCTV Camera # 7 for display on either console monitor.
- 8.6.141 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.
- 8.6.142 Operate the console's CTX-800 IRIS switch in the OPEN position to observe a detectable increase in lighting intensity on the selected monitor.
- 8.6.143 Operate the console's CTX-800 IRIS switch in the CLOSE position to observe a detectable decrease in lighting intensity on the selected monitor.
- 8.6.144 Operate the console's CTX-800 IRIS switch to obtain a well contrasted image on the selected monitor.
- 8.6.145 Select the LENS FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.146 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.

- 8.6.147 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.148 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.
- 8.6.149 Select the OPTICAL FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.150 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.151 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.152 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.
- 8.6.153 Operate the console's CTX-800 ZOOM switch in the IN position to obtain a zoomed-in display. Use focus and/or iris control as required to obtain a clear display on the monitor.
- 8.6.154 Operate the console's CTX-800 ZOOM switch in the OUT position to obtain a zoomed-out display. Use focus and/or iris control as required to obtain a clear display on the monitor.

- 8.6.155 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.

Acceptance Criteria

- . CCTV Camera # 7's IRIS control operates to open and close the camera's iris from OCC-1.
- . CCTV Camera # 7's LENS FOCUS Focus control operates to obtain near and far focus from OCC-1.
- . CCTV Camera # 7's OPTICAL FOCUS Focus control operates to obtain near and far focus from OCC-1.
- . CCTV Camera # 7's ZOOM control operates to obtain zoomed-in and zoomed-out images from OCC-1. Zoomed images may adjusted for clarity.

Test Conductor Unigil MCh Date 9/8/92

QA _____ Date _____

- 8.6.156 Place CCTV Camera # 8 in service for testing with an identifiable visual object or target in the field of view.
- 8.6.157 At Operator Control Console # 1, select CCTV Camera # 8 for display on either console monitor.
- 8.6.158 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.
- 8.6.159 Operate the console's CTX-800 LIGHTS ON switch to illuminate the camera's local spotlight.
- 8.6.160 Operate the console's CTX-800 BRIGHT/DIM switch to obtain full illumination and decreased illumination from the camera's spotlight.
- 8.6.161 Select the DIM mode of illumination and operate the Variac # 8 controls in the Video Control Cabinets to adjust the level of illumination.
- 8.6.162 Operate the console's CTX-800 LIGHTS OFF switch to de-energize the camera's local spotlight.

- 8.6.163 Operate the console's CTX-800 LIGHTS ON switch and BRIGHT switch, as required, to fully illuminate the camera's local spotlight.
- 8.6.164 Operate the console's CTX-800 IRIS switch in the OPEN position to observe a detectable increase in lighting intensity on the selected monitor.
- 8.6.165 Operate the console's CTX-800 IRIS switch in the CLOSE position to observe a detectable decrease in lighting intensity on the selected monitor.
- 8.6.166 Operate the console's CTX-800 IRIS switch to obtain a well contrasted image on the selected monitor.
- 8.6.167 Select the LENS FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.168 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.169 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.170 Select the OPTICAL FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.171 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.172 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.173 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.

- 8.6.174 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual and turn off the spotlight.

Acceptance Criteria

- ✓ CCTV Camera # 8's spotlight illuminates and extinguishes in response to the camera controls from OCC-1.
- ✓ CCTV Camera # 8's spotlight illuminates at bright and dim intensity in response to the camera controls at OCC-1.
- ✓ CCTV Camera # 8's variac control operates to change the level of spotlight's illumination.
- ✓ CCTV Camera # 8's IRIS control operates to open and close the camera's iris from OCC-1.
- ✓ CCTV Camera # 8's OPTICAL FOCUS Focus control operates to obtain near and far focus from OCC-1.
- ✓ CCTV Camera # 8's LENS FOCUS Focus control operates to obtain near and far focus from OCC-1.

Test Conductor Michael Ch Date 9/8/92

Date 9/8/92

— 2 —

Date

- 8.6.175 Place CCTV Camera # 9 in service for testing with an identifiable visual object or target in the field of view.
- 8.6.176 At Operator Control Console # 1, select CCTV Camera # 9 for display on either console monitor.
- 8.6.177 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.
- 8.6.178 Operate the console's CTX-800 IRIS switch in the OPEN position to observe a detectable increase in lighting intensity on the selected monitor.

- 8.6.179 Operate the console's CTX-800 IRIS switch in the CLOSE position to observe a detectable decrease in lighting intensity on the selected monitor.
- 8.6.180 Operate the console's CTX-800 IRIS switch to obtain a well contrasted image on the selected monitor.
- 8.6.181 Select the LENS FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.182 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.183 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.184 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.
- 8.6.185 Select the OPTICAL FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.186 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.187 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.188 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.
- 8.6.189 Operate the console's CTX-800 ZOOM switch in the IN position to obtain a zoomed-in display. Use focus and/or iris control as required to obtain a clear display on the monitor.
- 8.6.190 Operate the console's CTX-800 ZOOM switch in the OUT position to obtain a zoomed-out display. Use focus and/or iris control as required to obtain a clear display on the monitor.

- 8.6.191 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.

Acceptance Criteria

- . CCTV Camera # 9's IRIS control operates to open and close the camera's iris from OCC-1.
- . CCTV Camera # 9's LENS FOCUS Focus control operates to obtain near and far focus from OCC-1.
- . CCTV Camera # 9's OPTICAL FOCUS Focus control operates to obtain near and far focus from OCC-1.
- . CCTV Camera # 9's ZOOM control operates to obtain zoomed-in and zoomed-out images from OCC-1. Zoomed images may adjusted for clarity.

Test Conductor David M. Ph... Date 9/12/92

Date 9/2/92

~~Q-A~~

~~Date~~ _____

- 8.6.192 Place CCTV Camera # 10 in service for testing with an identifiable visual object or target in the field of view.
- 8.6.193 At Operator Control Console # 1, select CCTV Camera # 10 for display on either console monitor.
- 8.6.194 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.
- 8.6.195 Operate the console's CTX-800 IRIS switch in the OPEN position to observe a detectable increase in lighting intensity on the selected monitor.
- 8.6.196 Operate the console's CTX-800 IRIS switch in the CLOSE position to observe a detectable decrease in lighting intensity on the selected monitor.
- 8.6.197 Operate the console's CTX-800 IRIS switch to obtain a well contrasted image on the selected monitor.

- 8.6.198 Select the LENS FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.199 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.200 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.201 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.
- 8.6.202 Select the OPTICAL FOCUS option at Operator Control Console # 1's CTX-800 Control Transmitter.
- 8.6.203 Operate the console's CTX-800 FOCUS switch in the NEAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.204 Operate the console's CTX-800 FOCUS switch in the FAR position to observe a detectable difference in focus on the selected monitor.
- 8.6.205 Operate the console's CTX-800 FOCUS switch to obtain a clear image on the selected monitor.
- 8.6.206 Operate the console's CTX-800 ZOOM switch in the IN position to obtain a zoomed-in display. Use focus and/or iris control as required to obtain a clear display on the monitor.
- 8.6.207 Operate the console's CTX-800 ZOOM switch in the OUT position to obtain a zoomed-out display. Use focus and/or iris control as required to obtain a clear display on the monitor.

- 8.6.208 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.

Acceptance Criteria

- . CCTV Camera # 10's IRIS control operates to open and close the camera's iris from OCC-1.
- . CCTV Camera # 10's LENS FOCUS Focus control operates to obtain near and far focus from OCC-1.
- . CCTV Camera # 10's OPTICAL FOCUS Focus control operates to obtain near and far focus from OCC-1.
- . CCTV Camera # 10's ZOOM control operates to obtain zoomed-in and zoomed-out images from OCC-1. Zoomed images may adjusted for clarity.

Test Conductor

W. J. M. C. H.

Date 9/18/92

QA

Date

~~8.6.209 Place CCTV Camera # 11 in service for testing with an identifiable visual object or target in the field of view.~~

~~8.6.210 At Operator Control Console # 1, select CCTV Camera # 11 for display on either console monitor.~~

~~8.6.211 Select the OCC-1 CTX-800 manual mode for iris control as per the vendor's manual.~~

~~8.6.212 Operate the console's CTX-800 IRIS switch in the OPEN position to observe a detectable increase in lighting intensity on the selected monitor.~~

~~8.6.213 Operate the console's CTX-800 IRIS switch in the CLOSE position to observe a detectable decrease in lighting intensity on the selected monitor.~~

~~8.6.214 Operate the console's CTX-800 IRIS switch to obtain a well contrasted image on the selected monitor.~~

NOTE

The following testing demonstrates the CCTV Camera Pan and Tilt functions where provided. No measurements of range of motion are required for this testing.

- 8.6.243 Place CCTV Camera # 3 in service for testing of the Pan/Tilt feature at OCC-1.
- 8.6.244 At Operator Control Console # 1, select CCTV Camera # 3 for display on either console monitor.

NOTE

All pan and/or tilt operations are to be locally monitored for interference UNTIL or UNLESS the limit stops are set, if required.

- 8.6.245 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain RIGHT Pan as indicated by a change of the viewing position to the right on the monitor.
- 8.6.246 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain LEFT Pan as indicated by a change of the viewing position to the left on the monitor.
- 8.6.247 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain UP Tilt as indicated by a upward change of the viewing position on the monitor.
- 8.6.248 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain DOWN Tilt as indicated by a downward change of the viewing position on the monitor.

~~8.6.257 At Operator Control Console # 2, use the CTX-800 Control Transmitter joy-stick to obtain LEFT Pan as indicated by a change of the viewing position to the left on the monitor.~~

~~8.6.258 At Operator Control Console # 2, use the CTX-800 Control Transmitter joy-stick to obtain UP Tilt as indicated by a upward change of the viewing position on the monitor.~~

~~8.6.259 At Operator Control Console # 2, use the CTX-800 Control Transmitter joy-stick to obtain DOWN Tilt as indicated by a downward change of the viewing position on the monitor.~~

Acceptance Criteria

- ~~. Right PAN motion is obtained for CCTV Camera # 3 from the Operator Control Console # 2 joystick in the RIGHT position.~~
- ~~. Left PAN motion is obtained for CCTV Camera # 3 from the Operator Control Console # 2 joystick in the LEFT position.~~
- ~~. Upward TILT motion is obtained for CCTV Camera # 3 from the Operator Control Console # 2 joystick in the UP position.~~
- ~~. Downward TILT motion is obtained for CCTV Camera # 3 from the Operator Control Console # 2 joystick in the DOWN position.~~

~~Test Conductor _____ Date _____~~

~~QA _____ Date _____~~

8.6.260 Place CCTV Camera # 4 in service for testing of the Pan/Tilt feature.

8.6.261 At Operator Control Console # 1, select CCTV Camera # 4 for display on either console monitor.

8.6.262 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain RIGHT Pan as indicated by a change of the viewing position to the right on the monitor.

- 8.6.263 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain LEFT Pan as indicated by a change of the viewing position to the left on the monitor.
- 8.6.264 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain UP Tilt as indicated by a upward change of the viewing position on the monitor.
- 8.6.265 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain DOWN Tilt as indicated by a downward change of the viewing position on the monitor.

~~8.6.266 Use the CTX-800 Control Transmitter joy-stick to obtain RIGHT Pan to the end of travel or until interference is reported.~~

~~IF interference is reported, THEN set the right-pan limit stop to avoid interference.~~

~~___ Right pan limit set OR~~

~~___ Not Applicable~~

~~8.6.267 Use the CTX-800 Control Transmitter joy-stick to obtain LEFT Pan to the end of travel or until interference is reported.~~

~~IF interference is reported, THEN set the left-pan limit stop to avoid interference.~~

~~___ Left pan limit set OR~~

~~___ Not Applicable~~

~~8.6.268 Use the CTX-800 Control Transmitter joy-stick to obtain UP Tilt to the end of travel or until interference is reported.~~

~~IF interference is reported, THEN set the up-tilt limit stop to avoid interference.~~

~~___ Up tilt limit set OR~~

~~___ Not Applicable~~

- 8.6.271 Place CCTV Camera # 7 in service for testing of the Pan/Tilt feature.
- 8.6.272 At Operator Control Console # 1, select CCTV Camera # 1 for display on either console monitor.
- 8.6.273 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain RIGHT Pan as indicated by a change of the viewing position to the right on the monitor.
- 8.6.274 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain LEFT Pan as indicated by a change of the viewing position to the left on the monitor.
- 8.6.275 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain UP Tilt as indicated by an upward change of the viewing position on the monitor.
- 8.6.276 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain DOWN Tilt as indicated by a downward change of the viewing position on the monitor.

~~8.6.277 Use the CTX-800 Control Transmitter joy-stick to obtain RIGHT Pan to the end of travel or until interference is reported.~~

~~IF interference is reported, THEN set the right-pan limit stop to avoid interference.~~

~~___ Right pan limit set OR~~

~~___ Not Applicable~~

~~8.6.278 Use the CTX-800 Control Transmitter joy-stick to obtain LEFT Pan to the end of travel or until interference is reported.~~

~~IF interference is reported, THEN set the left-pan limit stop to avoid interference.~~

~~___ Left pan limit set OR~~

~~___ Not Applicable~~

- ~~8.6.281 Use the CTX-800 Control Transmitter joy-stick to obtain full-perimeter travel at the left, right, upper, and lower limits of travel to check for interferences.~~

Acceptance Criteria

- . Right PAN motion is obtained for CCTV Camera # 7 from the Operator Control Console # 1 joystick in the RIGHT position.
- . Left PAN motion is obtained for CCTV Camera # 7 from the Operator Control Console # 1 joystick in the LEFT position.
- . Upward TILT motion is obtained for CCTV Camera # 7 from the Operator Control Console # 1 joystick in the UP position.
- . Downward TILT motion is obtained for CCTV Camera # 7 from the Operator Control Console # 1 joystick in the DOWN position.
- . Pan RIGHT travel is without interference or limit stop is set.
- . Pan LEFT travel is without interference or limit stop is set.
- . Tilt UP travel is without interference or limit stop is set.
- . Tilt DOWN travel is without interference or limit stop is set.
- . Full-perimeter travel at limits is obtained without interference.

Test Conductor _____ Date _____

QA _____ Date _____

- 8.6.282 Place CCTV Camera # 9 in service for testing of the Pan/Tilt feature.
- 8.6.283 At Operator Control Console # 1, select CCTV Camera # 9 for display on either console monitor.

- 8.6.284 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain RIGHT Pan as indicated by a change of the viewing position to the right on the monitor.
- 8.6.285 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain LEFT Pan as indicated by a change of the viewing position to the left on the monitor.
- 8.6.286 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain UP Tilt as indicated by a upward change of the viewing position on the monitor.
- 8.6.287 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain DOWN Tilt as indicated by a downward change of the viewing position on the monitor.

~~8.6.288 Use the CTX-800 Control Transmitter joy-stick to obtain RIGHT Pan to the end of travel or until interference is reported.~~

~~IF interference is reported, THEN set the right-pan limit stop to avoid interference.~~

~~___ Right pan limit set OR~~

~~___ Not Applicable~~

8.6.289 Use the CTX-800 Control Transmitter joy-stick to obtain LEFT Pan to the end of travel or until interference is reported.

IF interference is reported, THEN set the left-pan limit stop to avoid interference.

___ Left pan limit set OR

___ Not Applicable

~~8.6.292 Use the CTK-800 Control Transmitter joy-stick to obtain full-perimeter travel at the left, right, upper, and lower limits of travel to check for interferences.~~

Acceptance Criteria

- . Right PAN motion is obtained for CCTV Camera # 9 from the Operator Control Console # 1 joystick in the RIGHT position.
- . Left PAN motion is obtained for CCTV Camera # 9 from the Operator Control Console # 1 joystick in the LEFT position.
- . Upward TILT motion is obtained for CCTV Camera # 9 from the Operator Control Console # 1 joystick in the UP position.
- . Downward TILT motion is obtained for CCTV Camera # 9 from the Operator Control Console # 1 joystick in the DOWN position.
- . Pan RIGHT travel is without interference or limit stop is set.
- . Pan LEFT travel is without interference or limit stop is set.
- . Tilt UP travel is without interference or limit stop is set.
- . Tilt DOWN travel is without interference or limit stop is set.
- . Full-perimeter travel at limits is obtained without interference.

Test Conductor _____ Date _____

QA _____ Date _____

8.6.293 Place CCTV Camera # 10 in service for testing of the Pan/Tilt feature.

8.6.294 At Operator Control Console # 1, select CCTV Camera # 10 for display on either console monitor.

- 8.6.295 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain RIGHT Pan as indicated by a change of the viewing position to the right on the monitor.
- 8.6.296 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain LEFT Pan as indicated by a change of the viewing position to the left on the monitor.
- 8.6.297 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain UP Tilt as indicated by a upward change of the viewing position on the monitor.
- 8.6.298 At Operator Control Console # 1, use the CTX-800 Control Transmitter joy-stick to obtain DOWN Tilt as indicated by a downward change of the viewing position on the monitor.

~~8.6.299 Use the CTX-800 Control Transmitter joy-stick to obtain RIGHT Pan to the end of travel or until interference is reported.~~

~~IF interference is reported, THEN set the right-pan limit stop to avoid interference.~~

~~___ Right pan limit set OR~~

~~___ Not Applicable~~

8.6.300 Use the CTX-800 Control Transmitter joy-stick to obtain LEFT Pan to the end of travel or until interference is reported.

IF interference is reported, THEN set the left-pan limit stop to avoid interference.

___ Left pan limit set OR

___ Not Applicable

8.6.301 Use the CTX-800 Control Transmitter joy-stick to obtain UP Tilt to the end of travel or until interference is reported.

IF interference is reported, THEN set the up-tilt limit stop to avoid interference.

___ Up tilt limit set OR

___ Not Applicable

9315-TP-201
TPCNY
ATTS

Volume in drive C is CONTROL
Directory of C:\MODICON\NUS

			11-13-91	11-13-91
			11-13-91	11-13-91
NUS	FIL	193846	10-17-91	10:10a
NUS	ISU	40	4-16-92	4:35a
NUS	UP9	6047	4-06-92	4:13a
NUS	RIO	11001	4-17-91	4:10a
NUS	JAP	15538	3-04-91	1:04p
NUS	JAP	166045	4-04-92	1:04p
NUS	EMS	140650	4-04-92	1:04c
NUS	FIL	17490	4-02-92	1:34p
RBT	TFR	427	5-01-92	10:13p
NUS	LMV	10006	10-17-91	10:00a
NUS	QML	16517	10-17-91	10:00a
NFB0	TFR	427	4-15-91	4:34a
COMPACT	TFR	427	3-01-92	10:55a
SS3	TFR	427	4-16-92	1:24p
DEBUG	TFR	427	4-17-90	1:17c
LTST	TFR	427	5-17-91	4:44p
SCREEN	TFR	427	1-17-91	1:48p
FWT	TFR	427	1-12-91	10:16a
PULL	TFR	427	4-01-92	1:40p
AT	TFR	427	4-15-91	4:40p
EMSF	TFR	427	4-16-91	1:44a
STATUS	TFR	427	4-16-91	1:51a
FAULTS	TFR	427	4-16-91	5:00a
CURRENT	TFR	427	11-11-91	1:53a
TEMP	JAT	16606	3-10-91	1:04p
OUT	TFR	427	1-15-92	4:11p
NUS	BIN	15566	4-06-92	4:10a
NUS	NWP	10000	4-06-92	4:10a
NUS	NWF	173096	4-06-92	4:10a

11 Files(s) 10997760 bytes free

TEST PROCEDURE	9315-TP-201	REVISION	0	PAGE	E-1
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APPENDIX E
CCTV ASSESSMENT FORM

CCTV Assessment

Operation: (describe type of operation here) Step 8.3.5 of TPCN4

Camera Assessment

Camera No. 3 Evaluation
(describe the view that the camera is capable of providing)

Camera #3 can be positioned to verify that rods have been partially extracted at the lower clamp. This assumes that the MT is not an interference.

Recommendations: (Recommend cameras that provide the best view of the system)

Camera 3 is adequate for this purpose

Test Conductor [Signature] Date 9/8/92
QA [Signature] Date 9/8/92

EST PROCEDURE 9315-TP-201

REVISION 0

PAGE E-2

CCTV Assessment

Operation: (describe type of operation here) step 2.3.5 of TPCN 4

Camera Assessment

Camera No. 7

Evaluation
(describe the view that the camera is capable of providing)

Camera #7 can be used to verify that no rod is unextracted, that is, camera 7 can see an individual fuel rod remaining on the clamping tube.

Recommendations: (Recommend cameras that provide the best view of the system)

Camera 7 is adequate for this purpose

Test Conductor

Daniel M. Cha

Date 9/8/92

QA

[Signature]

Date 9/8/92

4 of 7

EST PROCEDURE 9315-TP-201 REVISION 0 PAGE E-2

CCTV Assessment

Operation: (describe type of operation here) 8.3.43 of TPCN 4

Camera Assessment

Camera No. 3

Evaluation
(describe the view that the camera is capable of providing)

CCTV Camera 3 may be used to verify that all rods were extracted or to count the number of rods remaining.

Recommendations: (Recommend cameras that provide the best view of the system)

Camera 3 is adequate for the function assuming that the MT is clear

Test Conductor

Wigil M. Dha

Date 9/8/92

QA

Peter V. Jankel

Date 9/8/92

EST PROCEDURE 9315-TP-201 REVISION 0 PAGE E-2

CCTV Assessment

. Operation: (describe type of operation here) 8.3.43 d TPCW 4

. Camera Assessment

Camera No. 7

Evaluation
(describe the view that the camera is capable of
providing)

CCTV Camera 7 was used to verify that all rods were
extracted or to count the number of rods remaining in the
row.

Recommendations: (Recommend cameras that provide the best view of the system)

Camera 7 is adequate for the function.

Test Conductor

David M. Chan
Peter V. Jurek

Date 9/8/92

QA

Date 9/8/92

EST PROCEDURE 9315-TP-201 REVISION 0 PAGE E-2

CCTV Assessment

. Operation: (describe type of operation here) Step 9354 of TPCN 4

. Camera Assessment

Camera No. 8

Evaluation
(describe the view that the camera is capable of providing)

Camera 8 provides full view of Pull Head A but only a partial view of pull head B grippers. The view is adequate to identify if all rods are dropped. However, if rods were not released from pull head B, the exact rod total's location may not be identified.

Recommendations: (Recommend cameras that provide the best view of the system)

Camera 8 is adequate. It would be nice to rework the camera location or the side transfer proximity sensor to provide a full view of pull head B.

Test Conductor

Date 9/9/92

QA

Date 9/9/92

TEST PROCEDURE 9315-TP-201 REVISION 0 PAGE E-2

CCTV Assessment

Operation: (describe type of operation here) step 8.3.54 of TREN 4

Camera Assessment

Camera No. 4

Evaluation
(describe the view that the camera is capable of
providing)

C.

Camera #4 can provide partial view of pull heads from above.

Recommendations: (Recommend cameras that provide the best view of the system)

No recommendation. Camera 4 backup Camera 8. See also evaluation
of Camera 9:10.

Test Conductor

David M. Chen

Date 9/19/92

QA

L. Mulgrew

Date 9/19/92

TEST PROCEDURE

9315-TP-201

REVISION

0

PAGE E-2

CCTV Assessment

1. Operation: (describe type of operation here) TPCWU Step 3.5E

2. Camera Assessment

Camera No. 10

Evaluation

(describe the view that the camera is capable of providing)

C.

CCTV Camera 10 provides little useful backup for Camera 8

3. Recommendations: (Recommend cameras that provide the best view of the system)

None

Test Conductor

Daniel M. Elmer

Date 9/9/92

QA

W. J. [Signature]

Date 9/9/92

TEST PROCEDURE 9315-TP-201

REVISION 0

PAGE E-2

CCTV Assessment

1. Operation: (describe type of operation here) TPCN 4 step 23.52

2. Camera Assessment

Camera No. 9

Evaluation

(describe the view that the camera is capable of providing)

Camera 9, in conjunction with Camera 4, provides limited backup for camera #8. With cameras 4 & 9, pull head A grippers 1-8 and 13-17 can be observed. Pull Head B grippers 1-12 and 16-17 are observable.

3. Recommendations: (Recommend cameras that provide the best view of the system)

Camera 8 works best. There is no 100% backup available.

Test Conductor

David A. Khan
L. J. Martyn

Date 9/9/92

QA

Date 9/9/92

CCTV Assessment

. Operation: (describe type of operation here) TPCW4 step 803

. Camera Assessment

Camera No. 4

Evaluation

(describe the view that the camera is capable of providing)

C.

Camera 4 provides good coverage of the Rod Extraction System table and drives. Portions of the drive gear are blocked by structural steel. Not all of the grippers may be seen.

Recommendations: (Recommend cameras that provide the best view of the system)

None

Test Conductor

W. J. M. Chan

Date 9/10/92

QA

Peter J. J. J.

Date 9/29/92

TEST PROCEDURE 9315-TP-201

REVISION 0

PAGE E-2

CCTV Assessment

1. Operation: (describe type of operation here) TPCU 4 step 883

2. Camera Assessment

Camera No. 7

Evaluation

(describe the view that the camera is capable of providing)

C.

CCTV Camera 7 provides poor coverage of drives but provides excellent coverage of the cable management system. It provides useful backup coverage for Camera 4

3. Recommendations: (Recommend cameras that provide the best view of the system)

None.

Test Conductor

W. J. McEwen

Date 9/10/92

QA

Robert J. Judd

Date 9/29/92

9315-TP-201
TDCNY
Attachment 16

ENTRY NO.	FILM ROLL #	FRAME NO.	DATE/TIME	TEST NUMBER	EQUIPMENT/PURPOSE
	15	20	9/1/92	8.2.10	Pull Head near hard stop
		21	"	"	" " " " "
		17	"	8.2.18	" " " " "
		19	"	8.2.27	" " " " "
		18	"	8.2.35	" " " " "
		16	9/1/92	8.5.60	Test setup for pulling force
		12	9/8/92	8.3.4	Test setup for camera roll test
		11	"	8.3.10	Extended pull heads
		13	"	8.6.10	element length test setup
		9	9/9/92	8.7.12	Test Rod Alignment
		10	↓	8.7.12	"
		8		8.7.19	Gripped rods
		7		8.8.1	Gripper inserts

ADDITIONS TO PUNCH LIST

Att 17
p10FS

ITEM NO. 357 WBS NO. 1322 DATE 9/10/92 SOURCE W Chapman
 SYSTEM CCTV RESPONSIBLE ENGINEER JGP
 CATEGORY I-P I-S I-M I-O I-M (II)

DESCRIPTION

Relocate Camera 2 For Full view of Gripper at the drop code hold point or
otherwise resolve interference problem.

STATUS

Open

ADDITIONS TO PUNCH LIST

ITEM NO. _____ WBS NO. _____ DATE _____ SOURCE _____
 SYSTEM _____ RESPONSIBLE ENGINEER _____
 CATEGORY I-P I-S I-M I-O I-M II

DESCRIPTION

STATUS

ADDITIONS TO PUNCH LIST

ITEM NO. 352 WBS NO. 1322 DATE 9/10/92 SOURCE VW Chapman
 SYSTEM Red Extraction RESPONSIBLE ENGINEER VAC
 CATEGORY I-P I-S I-M I-O I-M (II)

DESCRIPTION

Repair proximity sensor cable connector on Pull Head A

STATUS

OPEN

ADDITIONS TO PUNCH LIST

ITEM NO. 357 WBS NO. 1212 DATE 9/10/92 SOURCE VW Chapman
 SYSTEM CCTV RESPONSIBLE ENGINEER GJP
 CATEGORY I-P I-S I-M I-O I-M (II)

DESCRIPTION

Evaluate backup coverage for CCTV Camera 2 in Red Extraction Hold
Point, is another camera required?

STATUS

OPEN

ADDITIONS TO PUNCH LIST

ITEM NO. 260 WBS NO. 1212 DATE 9/10/92 SOURCE VN Chapman
 SYSTEM CCTV RESPONSIBLE ENGINEER ASP
 CATEGORY I-P I-S I-N I-O I-M (II)

DESCRIPTION

For the TAN facility, CCTV Camera 3 must be positioned in respect to the
Manipulator Transporter such that the lower clamps on the Clamping Table
may be observed.

STATUS

OPEN

ADDITIONS TO PUNCH LIST

ITEM NO. 261 WBS NO. 1322 DATE 9/10/92 SOURCE VN Chapman
 SYSTEM ROB EXTRACTION RESPONSIBLE ENGINEER VAC
 CATEGORY I-P I-S I-N I-O I-M (II)

DESCRIPTION

Redesign pull heads to 1/ Allow for calibration of pulling force independent
of other load cell status or gripper operating sequence. 2/ Limit gripping
surface to design 1/2" valve 3/ eliminate problems related to
insertion length. 4/ Get 160 200 # ✓

STATUS

OPEN

ADDITIONS TO PUNCH LIST

ITEM NO. 262 WBS NO. 1322 DATE 9/10/92 SOURCE V.N. Chapman
SYSTEM ROD EXTRACTION RESPONSIBLE ENGINEER mc.
CATEGORY I-P I-S I-M I-O I-N (II)

DESCRIPTION

Provide rod clasp support to prevent dropped rod contact with
electrical components on the East end of the Clamping Table

STATUS

open

ADDITIONS TO PUNCH LIST

ITEM NO. 263 WBS NO. 1322 DATE 9/10/92 SOURCE V.N. Chapman
SYSTEM ROD EXTRACTION RESPONSIBLE ENGINEER mc.
CATEGORY I-P I-S I-M I-O I-N (II)

DESCRIPTION

Rework pull rod head drive proximity sensors for protection in
programmed operating modes.

STATUS

open

264/11

ADDITIONS TO PUNCH LIST

TPCW4
A++ 17
Page 5 of 5

ITEM NO. 264 WBS NO. 1322 DATE 9/10/92 SOURCE VN Chapman

SYSTEM Red Extraction RESPONSIBLE ENGINEER VNC

CATEGORY I-P I-S I-M I-O I-M (II)

DESCRIPTION

With redesign of pull heads, set gripper over torque fault - Fault window
to avoid occasional fault.

STATUS

Open

RCW22

ADDITIONS TO PUNCH LIST

ITEM NO. _____ WBS NO. _____ DATE _____ SOURCE _____

SYSTEM _____ RESPONSIBLE ENGINEER _____

CATEGORY I-P I-S I-M I-O I-M II

DESCRIPTION

STATUS

ADDITIONS TO PUNCH LIST

ITEM NO. 265 WBS NO. 1322 DATE 9/11/92 SOURCE VU Chapman
SYSTEM Red Extraction RESPONSIBLE ENGINEER VU Chapman
CATEGORY I-P I-S I-N I-O I-M II

DESCRIPTION

Evaluate obtaining design extraction speed of 191ipm
average.

STATUS

Open

ADDITIONS TO PUNCH LIST

ITEM NO. _____ WBS NO. _____ DATE _____ SOURCE _____
SYSTEM _____ RESPONSIBLE ENGINEER _____
CATEGORY I-P I-S I-N I-O I-M II

DESCRIPTION

STATUS

ORR CATEGORY DEFINITIONS

I-F REQUIRED FOR A FAT

I-I NOT PERFORMED FOR REFOCUS

DOE ROD CONSOLIDATION PROJECT

9/25/92

I-S REQUIRED FOR A SOT

TEST PROGRAM

COLD TEST FACILITY

I-N REQUIRED FOR REFOCUS NORMAL IST

OPEN ITEMS TRACKING LIST

ITEM NUMBER	WBS	ENTRY DATE	SOURCE ACTIVITY	SYSTEM NAME	RESPONSIBLE ENGINEER	ITEM DESCRIPTION	ORR CAT	STATUS
0001	1213	2/12/92	FAT 1213	RM 10A STORAGE RACK	FGG	RACK NEEDS TO BE INSTALLED.	I-I	OPEN
0002	1311	2/12/92	FAT RL 1	FUEL ASSEMBLY STORAGE RAC	FGG	FAILED DIMENSIONAL VERIFICATION. QA PACKAGE NOT SIGNED OFF. NCR C-156 NEEDS TO BE APPROVED.	I-I	OPEN - NCR DISPOSITIONED. OKAY TO USE FOR 1ST. MUST REWORK PRIOR TO SHIPPING.
0003	1312	2/12/92	FAT 1312	DOWNENDER	KBH	PROXIMITY SENSORS, CABLE BRACKETS, AND CABLE CONNECTORS NEEDED.	I-I	OPEN - TEMPORARY BRACKETS PROVIDED FOR REFOCUS TESTING.
0004	1352	2/12/92	FG WALKDOWN	OFF NORMAL STATION	FGG	RELOCATE LOAD CELL ASSEMBLY TO INTERFACE WITH FAHF.	I-N	CLOSED - FAHF WAS REDESIGNED.
0005	1352	2/12/92	FG WALKDOWN	OFF NORMAL STATION	FGG	ADD LOAD CELL SUPPORT PLATE UNDER SPRING RETAINER CUP.	I-S	DONE - FGG 3/17/92.
0006	1352	2/12/92	FG WALKDOWN	OFF NORMAL STATION	FGG	ADD SPACE PLATE ON TOP OF GRID.	I-S	DONE - FGG 3/17/92.
0007	1352	2/12/92	FG WALKDOWN	OFF NORMAL STATION	FGG	FIX CLAMP ASSEMBLY BY REMOVING BROKEN BOLT END FROM THREADED HOLE AND REPLACE WITH NEW BOLT.	I-S	DONE
0008	1352	2/12/92	FG WALKDOWN	OFF NORMAL STATION	FGG	FIX END PLATE ON DRIVE SCREW (M- 1628, ITEM 29).	I-S	DONE - FGG 3/17/92.
0009	1352	2/12/92	FG WALKDOWN	OFF NORMAL STATION	FGG	ADD SPACERS TO CLAMP PAD (M- 1628, ITEM 6).	I-S	DONE - FGG 3/17/92.

0010	1352	2/12/92	FG WALKDOWN	OFF NORMAL STATION	FGG	ADD HARD STOPS FOR CLOSE POSITION OF CLAMP PAD TO GRID PLATE.	I-S	DONE - FGG 3/17/92.
0011	1352	2/12/92	FG WALKDOWN	OFF NORMAL STATION	GJP	ADD CABLE BRACKETS AND STRAIN RELIEFS FOR MOTORS.	II	OPEN
0012	1352	2/12/92	FG WALKDOWN	OFF NORMAL STATION	GJP	ADD CABLE CONNECTOR SUPPORT TO INTERFACE WITH RM-10A.	I-S	DONE - FGG 3/17/92.
0013	1352	2/12/92	FG WALKDOWN	OFF NORMAL STATION	FGG	LIFTING FEATURES TO EACH CLAMP ASSEMBLY IF NECESSARY.	II	OPEN
0014	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	PIN/THREADED HOLES ON TABLE TOP (38 INCH CLAMP POSITION APPEARS TO INTERFERE WITH FAHF).	I-N	CLOSED - FAHF DESIGN CHANGE ELIMINATED NEED. FGG 3/02/92.
0015	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	PUR LOWER CLAMP SUPPORT PLATE - PINS INTERFERING WITH POSITIONING OF LOWER CLAMP ASSEMBLY IN EAST POSITION.	I-S	DONE - FGG 3/17/92. WORK COMPLETED.
0016	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	PUR LOWER CLAMP JAWS NEED ADJUSTMENTS TO CENTER.	I-S	DONE - FGG 3/02/92. WORK COMPLETED.
0017	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	PUR LOWE CLAMP ASSEMBLY - RE-EVALUATE CLEARANCE (TOLERANCE OF HOLE) BETWEEN LOCATING PINS TO PERMIT PROPER POSITIONING.	II	OPEN
0018	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	GJP	CABLE BRACKETS FOR SUPPORT/RESTRAINT SEE #0019.	II	OPEN
0019	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	GJP	CABLE CONNECTOR BRACKETS (MUST INTERFACE WITH RM 10A).	I-S	DONE - NOT TO ITEM #0018. FGG 3/17/92.
0020	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	UPPER CLAMP ASSEMBLY MISSING PARTS - UPPER CLAMP SUPPORT PLATE AND BLW CLAMP SUPPORT		

0021	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	COMPLETE THE ASSEMBLY OF THE FOLLOWING: LOWER PWR CLAMP, UPPER PWR CLAMP, UPPER BUR CLAMP.	I-S	DONE - FGG 3/17/92.
0022	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	GJP	DESIGN THE PROXIMITY SWITCH BRACKETS.	I-S	COMPLETED - FGG 3/02/92.
0023	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	MODIFY MAIN TABLE DRIVE MOTOR SHAFT CONNECTOR.	I-S	DONE - FGG 3/17/92.
0024	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	CHAMFER NORTH-EAST AND SOUTH-EAST CORNER OF MAIN DRIVE MOTOR GEAR BOX MOUNTING PLATE FOR REMOTE INSTALLATION.	I-S	DONE - 4/21/92 - FGG.
0025	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	CLEAN CLAMPING TABLE AND CRUD COLLECTION SYSTEM.	II	DONE - 4/21/92 - FGG.
0026	1321	2/12/92	FAT 1321	CLAMPING TABLE	EBF	COMPLETE FAT.	I-S	COMPLETED - FGG 3/02/92 - SEE #78.
0027	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	REDESIGN PWR LOAD CELL ASSEMBLY TO PROTECT DIAPHRAM ON LOAD CELLS.	I-S	COMPLETED - FGG 3/02/92.
0028	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	DESIGN BUR CLAMP ASSEMBLY LOAD CELL ASSEMBLIES (SEE ITEM 27 ALSO).	I-S	DONE - FGG 3/17/92.
0029	1321	2/12/92	FG WALKDOWN	CLAMPING TABLE	FGG	VERIFY ALL BOLTS ARE PROPERLY TORQUED.	II	DONE - FGG 3/02/92.
0030	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	GJP	DESIGN BRACKETS FOR CAMERA #5 MOUNTING.	I-M	DONE - WORK COMPLETED 2-26 PER KBH.
0031	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	GJP	DESIGN MICROPHONE BRACKETS.	I-S	DONE - 3/17/92. PERMANENT OR TEMPORARY.

0033	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	GJP	DESIGN BRACKETS FOR PROXIMITY SWITCHES.	I-S	DONE - FGG 4/22/92.	OPEN
0034	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	FGG	REDESIGN AND INSTALL LIFTING FIXTURES FOR SAW REMOVAL.	II	OPEN - REDESIGN COMPLETED, DCW-1102 MANUFACTURING ON PARTS NOT INITIATED.	
0035	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	GJP	DESIGN CABLE BRACKETS AND RESTRAINTS.	II	OPEN	
0036	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	GJP	DESIGN CABLE CONNECTOR BRACKETS (MUST INTERFACE WITHIN RM 10A).	II	OPEN	
0037	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	KBH	MODIFY COVER DESIGN TO PROVIDE CLEARANCE FOR BUR & PWR FUEL ON STAGING TABLE.	II	OPEN	
0038	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	FGG	PIVOT ASSEMBLY - EVALUATE DESIGN FOR REMOTE POSITIONING OF SAW FOR DIFFERENT LENGTH FUEL ASSEMBLIES.	II	OPEN - DESIGN EVALUATED MANUFACTURING OF PARTS NOT INITIATED.	
0039	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	FGG	MODIFY MOTOR SHAFT COUPLERS FOR MOTORS WHICH ARE REMOVABLE.	II	OPEN - 90% OF ALL MOTORS COMPLETED.	
0040	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	FGG	REPLACE NORTH CLAMP ACTUATOR BRACKET ATTACHMENT BOLTS WITH LONGER BOLTS.	II	DONE - WORK COMPLETED BY KBH 2/26/92.	
0041	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	GJC	SET LIMIT SWITCHES ON CLAMP MOTORS.	I-S	DONE - GJC.	
0042	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	GJC	ADJUST PROXIMITY SENSORS.	I-S	DONE - FGG 3/17/92.	
0043	1315	2/12/92	FG WALKDOWN	LOWER CUTTING SYSTEM	FGG	COMPLETE THE FABRICATION OF THE	II	OPEN	

LOWER CRUD FINES COLLECTION
HOPPER.

0044	1212	2/22/92	SOT 600	CCTV	GJP	INSTALL CAMERAS, CORRECT CAMERA AND LIGHT MOVEMENT CLEARANCES, CORRECT LIMIT SWITCHES, INSTALL LIGHT FIXTURES AND MICROPHONES. PURCHASE AND MODIFY TOOLS.	II	CLOSED - ALL COMPLETED. MICROPHONES HAVE TEMPORARY SUPPORTS.
0045	1213	2/22/92	SYS CHART	RM 10 A	CRC		II	OPEN - SOME WORK COMPLETED.
0046	1213	2/22/92	SYS CHART	RM 10 A		INSTALL RM 10 A SUPPORT STAND.	I-S	DUPLICATES ITEM 1. EBF 3/10/92.
0047	1213	2/22/92	SYS CHART	RM 10 A	FGG	REPAIR LOAD CELL REMOVAL TOOL.	I-S	DONE - FGG 3/17/92.
0048	1213	2/22/92	SYS CHART	RM 10 A	CRC	INSTALL AIR LINES.	II	OPEN
0049	1213	2/22/92	SYS CHART	RM 10 A	KBH/GJP	TRAINING FOR RM 10 A OPERATORS.	I-S	COMPLETED BY KBH 2/26/92.
0050	1214	2/22/92	SYS CHART	RBT	GJP	LIMIT SWITCHES NEED TO BE SET.	I-N	DONE - GJC WORK COMPLETED.
0051	1214	2/22/92	SYS CHART	RBT	GJC/GJP	NEED TO SET UP OPERATING POSITIONS.	I-N	IN PROCESS ON 9/09/92.
0052	1215	2/22/92	SYS CHART	MANIPULATOR TRANSPORTER	GJC	NEED TO SET UP OPERATING POSITIONS.	II	OPEN - SAFE POSITION MUST NOT INTERFERE WITH CCTV COVERAGE.
0053	1311	2/22/92	FAT RL 2	FUEL ASSEMBLY STORAGE RAC	GJP	REPLACE THE ONE LOAD CELL TRAY 6, WHICH IS OUT FOR REPAIR (RL #2 OF SOT).	II	OPEN - PHYSICAL WORK COMPLETED 5/01/92. RETEST, IF NEEDED, FOR FUTURE TESTING AT CTF OR TAN.
0054	1311	2/22/92	SYS CHART	FUEL ASSEMBLY STORAGE RAC	GJC	NEED TP SETUP CONTROL SYSTEM FOR LEVEL 6 LOAD CELLS.	II	OPEN

0055	1321	2/22/92	SYS CHART	CLAMPING TABLE	FGG	BWR UPPER COMB ASSEMBLY NEEDS TO BE COMPLETED.	I-S	DOME - FGG 3/17/92.
0056	1321	2/22/92	SYS CHART	CLAMPING TABLE	FGG	NEED TO INSTALL LOAD CELL CABLES, CLAMP DRIVE CABLES, PROXIMITY SENSOR CABLES.	I-S	DOME - 4/21/92 FGG.
0057	1321	2/22/92	SYS CHART	CLAMPING TABLE	GJC	NEED TO SET UP ALL MOTOR PARAMETERS, LOAD CELLS PROXIMITY SENSORS, TABLE POSITIONS, AND CLAMP POSITIONS.	I-S	DOME
0058	1322	2/22/92	SYS CHART	ROD EXTRACTION SYSTEM		REPAIR AND INSTALL SOUTH CARRIAGE DRIVE MOTOR.	I-S	DOME
0059	1322	2/22/92	SYS CHART	ROD EXTRACTION SYSTEM	JAS	ASSEMBLE PULL HEADS AND DETERMINE ACTUATOR WEDGE CONFIGURATION.	II	OPEN - COMPLETED FOR W 17X17 ONLY.
0060	1322	2/22/92	SYS CHART	ROD EXTRACTION SYSTEM	JAS	INSTALL LOAD CELLS FOR PULL HEADS.	II	OPEN - COMPLETED FOR W 17X17 PULL HEADS ONLY.
0061	1322	2/22/92	SYS CHART	ROD EXTRACTION SYSTEM	TFM	ADDRESS ASSEMBLY STEPS THAT WERE NOT SIGNED OFF.	I-S	DOME - FGG 4/21/92.
0062	1322	2/22/92	SYS CHART	ROD EXTRACTION SYSTEM		NEED TO INSTALL CARRIAGE DRIVE MOTOR CABLES - REDESIGN BRACKET.	I-S	DOME - FGG 4/21/92.
0063	1322	2/22/92	SYS CHART	ROD EXTRACTION SYSTEM	FGG	NEED TO INSTALL PULL HEAD CABLES.	I-S	DOME
0064	1322	2/22/92	SYS CHART	ROD EXTRACTION SYSTEM	GJP	PROXIMITY SWITCHES NEED TO BE INSTALLED.	I-S	DOME
0065	1322	2/22/92	SYS CHART	ROD EXTRACTION SYSTEM	GJC	NEED TO SET UP MOTOR PARAMETERS, 4 PROXIMITY SENSORS, DRIVE POSITIONS, LOAD	I-S	CLOSED - COMPLETED WORK.

0066	1324	2/22/92	SYS CHART	ROD LOADING	GJP	NEED TO INSTALL CABLES FOR DRIVE MOTORS, PROXIMITY SENSORS AND MICROPHONES.	I-I	OPEN - TEMPORARY INSTALLATION OF MICROPHONES MADE FOR REFOCUSED TESTING.
0067	1324	2/22/92	SYS CHART	ROD LOADING	GJC	NEED TO SET UP MOTOR PARAMETERS, PROXIMITY SENSORS, DRIVE POSITIONS.	I-S	CLOSED - COMPLETED WORK.
0068	1331	2/22/92	SYS CHART	FUEL CANISTER UPENDER		INSTALL CLAMP DRIVE.	I-S	DOME
0069	1331	2/22/92	SYS CHART	FUEL CANISTER UPENDER		INSTALL CABLES TO MOTORS, PROXIMITY SENSORS, AND LOAD CELL.	I-S	DOME
0070	1318	2/22/92	SYS CHART	FUEL CANISTER FIXTURE	FGG	NEED TO BE REDESIGNED FOR INTERFERENCES.	I-S	DOME - FGG 3/17/92.
0071	1313	2/26/92	HAYNES	STAGING/CUTTING		INSTALL CABLE CONNECTOR BRACKETS FOR CLAMP MOTORS AND RESOLVERS.	I-M	WORK COMPLETED. FGG 3/17/92.
0072	1313	2/26/92	HAYNES	STAGING/CUTTING		ADD LOAD CELL SUPPORT PLATE UNDER SPRING RETAINER CUP (3 PLACES).	I-M	WORK COMPLETED. FGG 3/17/92.
0073	1313	2/26/92	HAYNES	STAGING/CUTTING		INSTALL CABLE CONNECTOR BRACKETS FOR LOAD CELLS.	I-M	WORK COMPLETED. FGG 3/17/92.
0074	1313	2/26/92	HAYNES	STAGING/CUTTING		RETEST SECTIONS OF SOT (CLAMP OPENINGS AND FORCE TEST).	I-S	DOME - FGG 4/22/92.
0075	1318	2/26/92	HAYNES	FUEL HANDLING FIXTURE		MODIFY CLAMPS, CAM PLATES, ETC. PARTS REQUIRE FABRICATION AND INSTALLATION.	I-S	DOME - 4/22/92 FGG.
0076	1311	2/26/92	HAYNES	FUEL HANDLING FIXTURE		PUR FANF HAS INTERFERENCE WITH FASR. MODIFICATION REQUIRED.	I-S	DOME - 4/22/92 FGG.

0077	1321	3/02/92	FAT 1321	CLAMPING TABLE	FGG	UPPER CLAMP DID NOT ROTATE WITHIN TOLERANCE.	I-S	DONE - ROTATES NOW. FGG 3/17/92
0078	1321	3/02/92	FAT 1321	CLAMPING TABLE	FGG	REPEAT CLAMP MOVEMENT WITH MOTOR INSTALLED.	I-S	DONE - FGG 3/17/92.
0079	1342	3/02/92	GALLO	MFBC UPENDER	FGG	INSTALL REPLACEMENT MOTOR.	I-S	DONE - FGG 3/17/92.
0080	1342	3/02/92	SYS CHART	MFBC UPENDER	FGG	NEED TO SET TRAVEL LIMITS FOR OPERATIONAL POSITION.	I-S	DONE - FGG 4/21/92.
0081	1313	3/05/92	SOT SETUP	STAGING/CUTTING	KBH	REPLACE BROKEN SCREW SHAFT ON LOWER CLAMP.	I-S	DONE - SCREW AND CLAMP ASSEMBLY SWAPPED WITH OFF NORMAL CLAMP A, WHICH DOES NOT NEED A
0082	1215	3/05/92	MT SOT	MANIPULATOR TRANSPORTER	FGC	RESOLVE REPAIR LOG ITEMS.	II	SUPERCEDED BY ITEMS 95 AND 96.
0083	1352	3/10/92	SOT RL #10	OFF NORMAL STATION	VNC	TEST LOAD CELL ACTUATION AS PART OF FAHF SOT BY SETTING FUEL DOWN ON OFF NORMAL STATION. (RETEST 8.1.5.6 AND 8.3.5.6).	II	OPEN
0084	1352	3/10/92	SOT RL #9	OFF NORMAL STATION	VNC	VERIFY CAMERA CALL FOR OFF NORMAL STATION CAMERA'S 3 AND 7. (RETEST 8.1.4.4 AND 8.3.4.4).	II	OPEN FOR CAMERA 7.
0085	1331	3/10/92	PVJ LTR	FUEL CANISTER UPENDER	FGG	PROVIDE CAPABILITY FOR REMOTE RELOCATION OF THE CANISTER BOTTOM SUPPORT.	II	OPEN
0086	1211	3/10/92	G. COLE	CONTROL SYSTEM	GJC	INVESTIGATE PROBLEM WITH PROXIMITY SWITCHES.	I-N	OPEN - CONTINUE WITH SET UP AND EVALUATE PROBLEMS AS THEY EXIST. RECHECK DOWNENDER.
0087	1211	3/10/92	G. COLE	CONTROL SYSTEM	GJC	BAD MODULE FOR CURRENT MONITOR.	I-S	DONE - POOR TERMINAL STRIP CONNECTION.

0088	1211	3/10/92	G. COLE	CONTROL SYSTEM	GJC	BAD MODULE FOR LOAD CELLS.	I-S	CLOSED - PROBLEM DID NOT RECUR.
0089	1212	3/10/92	G. COLE	CCTV	GJC	9" MONITOR (OC-2) IS BAD, SWITCHER PROBLEMS, CAMERA AND CONTROLLER 11 ARE BAD, NEED TO SET TILT LIMIT SWITCHES.	I-M	DONE - WORK COMPLETED.
0090	1212	3/10/92	G. COLE	CCTV	GJC	CAMERA 7 (NORTH WALL) NOT INSTALLED.	11	CLOSED
0091	1212	3/10/92	GJP	CCTV	GJC	CAMERA 6 (UCS) AND 8 (RE) NOT INSTALLED.	I-S	DONE - WORK COMPLETED.
0092	1322	3/10/92	EBF	ROD EXTRACTION SYSTEM	FGG	RAISE MOTORS FOR CABLE MANAGEMENT SYSTEM.	I-S	DONE - FGG 4/22/92.
0093	1311	3/10/92	SOT RL#5	FUEL ASSEMBLY STORAGE RAC	FGG	DEFFECTIVE LOAD CELL IN TRAY 2A. REPAIR/REPLACE IF TESTING WILL REQUIRE SHELF 2A AT COLD TEST FACILITY OR TAN.	11	OPEN
0094	1311	3/10/92	SOT RL #1	FUEL ASSEMBLY STORAGE RAC	FGG	NEED MCR C-156 ISSUED ON DIMENSIONAL DISCREPANCIES.	11	CLOSED - SEE 0002.
0095	1215	3/10/92	SOT RL #3	MANIPULATOR TRANSPORTER	FGG	HARD STOP ENGAGED IN TRAVEL BOTH WEST AND EAST.	11	DONE - PHYSICAL WORK COMPLETED - 5/01/92.
0096	1215	3/10/92	SOT RL #4	MANIPULATOR TRANSPORTER	FGG	EXCESSIVE TRAVEL TIME AND LOW TRAVEL RATE. MOTOR SPEED NEEDS TO BE RESET.	11	CLOSED - 5/01/92.
0097	1342	3/17/92	FGG WALKDOWN	NFBC UPENDER	FGG	EVALUATE SHIMS UNDER GEAR BOX BASE PLATE.	11	OPEN
0098	1342	3/17/92	FGG WALKDOWN	NFBC UPENDER	FGG	LOAD CELL TO BE WIRED.	I-S	DONE - FGG 4/21/92.
0099	1342	3/17/92	FGG WALKDOWN	NFBC UPENDER	FGG	LIFTING BAIL FOR GEAR BOX AND	11	OPEN

CLAMP ASSEMBLY.

0100	1342	3/17/92	FGG WALKDOWN	NFBC UPENDER	FGG	EVALUATE REMOTE HANDLING OF COUPLER BETWEEN GEAR BOX AND MOVEABLE FRAME SHAFT.	II	OPEN
0101	1342	3/17/92	FGG WALKDOWN	NFBC UPENDER	FGG	ADD ELECTRICAL BOX TO CLAMP ASSEMBLY FOR ACTUATOR.	I-S	DONE - FGG 4/21/92.
0102	1342	3/17/92	FGG WALKDOWN	NFBC UPENDER	FGG	INSTALL PROXIMITY SENSOR AND REMOTE REMOVAL.	I-S	DONE - FGG 4/21/92.
0103	1342	3/17/92	FGG WALKDOWN	NFBC UPENDER	FGG	ADD SAFETY PINS TO PINS ON CLAMP AND ACTUATOR ARMS.	I-N	DONE - REPLACED PINS WITH BOLTS. FGG 4/21/92.
0104	1342	3/17/92	FGG WALKDOWN	NFBC UPENDER	FGG	ADD CABLE BRACKETS FOR EASE OF CABLE REMOVAL.	II	OPEN
0105	1342	3/17/92	FGG WALKDOWN	NFBC UPENDER	FGG	ACTUATOR CLAMP MOTOR NEEDS TO BE SET.	I-S	DONE - FGG 4/21/92.
0106	1341	3/17/92	FGG WALKDOWN	NFBC LOADER	FGG	FABRICATE LOAD CELL DESIGN.	I-S	CLOSED - LOAD CELL NOT TO BE USED. FGG 4/21/92.
0107	1341	3/17/92	FGG WALKDOWN	NFBC LOADER	FGG	VERIFY ALIGNMENT AND OPEN BOLT HOLES FOR WALL MOUNTED BRACKETS.	I-F	DONE - WORK COMPLETED - FGG 4/21/92.
0108	1341	3/17/92	FGG WALKDOWN	NFBC LOADER	FGG	FINISH FABRICATION OF REMOTE MAINTENANCE ITEMS.	II	OPEN
0109	1341	3/17/92	FGG WALKDOWN	NFBC LOADER	FGG	ADD CABLE BRACKETS AND SUPPORT BRACKETS FOR ELECTRICAL CONNECTORS.	II	OPEN - TEMPORARY SUPPORT INSTALLED FOR REFOCUSSED TESTING.
0110	1314	3/17/92	FGG WALKDOWN	UPPER CUTTING SYSTEM	FGG	INVESTIGATE OIL LEAKING FROM GEAR BOX.	II	DONE - WORK COMPLETED - FGG 4/22/92.

0111	1314	3/17/92	FGG WALKDOWN	UPPER CUTTING SYSTEM	FGG	EVALUATE INTERFERENCE BETWEEN UPPER CUTTING WITHHOPPER SIDE TRANSFER FRAME.	I-F	DONE - WORK COMPLETED - FGG 4/22/92.
0112	1314	3/17/92	FGG WALKDOWN	UPPER CUTTING SYSTEM	FGG	FIX AND REPOSITION MOTOR.	I-F	DONE - WORK COMPLETED - FGG 4/22/92.
0113	1314	3/17/92	FGG WALKDOWN	UPPER CUTTING SYSTEM	FGG	FINISH FABRICATION OF CLAMP ASSEMBLY FOR PUR AND BUR FUEL.	I-F	DONE - WORK COMPLETED - FGG 4/22/92.
0114	1314	3/17/92	FGG WALKDOWN	UPPER CUTTING SYSTEM	FGG	DEVELOP A STRIKER PLATE DESIGN.	I-S	DONE
0115	1314	3/17/92	FGG WALKDOWN	UPPER CUTTING SYSTEM	FGG	DEVELOP METHOD OF LOCATING B&W SKIRT AND GE TIE RODS.	II	OPEN - B&W EFFORT COMPLETED FOR REFOCUSED TESTING. GE NOT TO BE TESTED.
0116	1314	3/17/92	FGG WALKDOWN	UPPER CUTTING SYSTEM	FGG	LOCATE AND INSTALL PROXIMITY SENSORS.	I-S	DONE
0117	1314	3/17/92	FGG WALKDOWN	UPPER CUTTING SYSTEM	GJC	SET THE ACTUATOR AND MOTOR LIMIT SWITCHES.	I-S	DONE - COMPLETED ON 8/31/92.
0118	1314	3/17/92	FGG WALKDOWN	UPPER CUTTING SYSTEM	FGG	CABLE BRACKETS AND CABLE CONNECTORS.	II	OPEN - TEMPORARY BRACKETS AND CONNECTORS PROVIDED TO REFOCUSED TESTING.
0119	1314	3/17/92	FGG WALKDOWN	UPPER CUTTING SYSTEM	FGG	VERIFY BOLTS/SCREWS ARE TORQUED.	I-S	DONE - FGG 4/22/92.
0120	1344	3/17/92	FGG WALKDOWN	NEBC STORAGE RACK	FGG	EVALUATE ELECTRICAL CONNECTORS FOR RM10A INTERFACE.	II	OPEN
0121	1313	3/23/93	SOT RL #4	STAGING AND CUTTING	TFM	COMPLETE QA/QC DATA PACKAGE.	I-M	CLOSED - SEE TFM MEMO 92-C-66 DATED 8/11/92.

0122	1313	3/23/93	SOT RL #1	STAGING AND CUTTING	TFM	CRT TEST NEEDS COMPLETION.	II	OPEN
0123	1342	3/23/93	SOT RL #1	NFBC UPENDER	GJP	QA/QC DATA PACKAGE IS INCOMPLETE. DCN'S NOT VERIFIED.	II	OPEN
0124	1342	3/23/93	SOT RL #2	NFBC UPENDER	GJP	CRT TEST NEEDS COMPLETION.	II	CLOSED - REMOTE HANDLING COVERED IN ITEMS 99, 100, 104, AND 179.
0125	1214	3/23/93	SOT 600	RBT	GJC	RESOLVE FESTOON SYSTEM INTERFERENCE WITH CAMERA AND LIGHTS ON NORTH WALL.	II	OPEN - MADE TEMPORARY FIX FOR REFUSED TESTING. NEED FOR FURTHER EFFORT TO BE DETERMINED.
0126	1314	3/23/93	SOT RL #5	LOWER CUTTING SYSTEM	KBH	CUT 1048 PROXIMITY SENSOR CABLE LENGTHS AND ATTACH TO BRACKETS. ADD CABLE SUPPORTS FOR MAIN CABLE BUNDLE.	II	DOVE - 5/01/92.
0127	1213	3/23/93	SOT 214 RL--	RM 10A	GJC	REPROGRAM RM 10A MOVEMENTS TO MEET SPECIFICATION REQUIREMENT.	II	DOVE
0128	1214	3/23/93	SOT 213 RL 2	RBT	GJC	DESIGN/INSTALL NEW LIMIT SWITCH BRACKETS FOR RBT.	I-S	DOVE - FGG 4/21/92.
0129	1311	3/23/93	SOT 501 RL 6	FUEL ASSEMBLY STORAGE RAC	FGC	DESIGN/INSTALL FIX TO ACTUATE LOAD CELL 7B. WARPAGE IN RACK.	II	OPEN - MAKE FIX AND RETEST IF FUTURE TESTING TO BE PERFORMED IN CTF OR TAN ON SHELF 7B.
0130	1311	3/23/93	SOT 501 RL 1	FUEL ASSEMBLY STORAGE RAC	FGC	VERIFY DCN 459 MOUNT LIGHT BRACKET ON FASR IS CORRECT.	II	CLOSED - INSTALLATION NOT CORRECT BUT SATISFACTORY. NCR NOT REQUIRED ON STRUCTURE.
0131	1215	3/23/93	SOT 214 RL 3	MANIPULATOR TRANSPORTER	FGC	DESIGN/INSTALL NEW BRACKETS FOR MT LIMIT SWITCHES.	I-S	CLOSED - SEE 0095.
0132	1331	3/23/93	SOT 206 RL 1	FUEL CANISTER UPENDER	FGC	COMPLETE DCN'S 428, 762 AND 867.	I-N	OPEN - PHYSICAL WORK COMPLETED, PAPERWORK NOT CLOSED.

OVER HEIGHT SENSOR.

0134	1213	3/23/93	REMOLEC LTR	RM 10A	GJP	RESOLVE LOGICAL RELAY PROBLEM.	II	OPEN
0135	1331	3/23/93	SOT 206 RL 5	FUEL CANISTER LID	FGC	RETEST STEPS 8.17.7-8-9 OF 206 WHEN DOE FIXES SQUARE CANISTER LID.	I-M	DONE
0136	1211	3/23/93	PM REQUEST	CONTROL SYSTEM	IJZ	PROVIDE STATEMENT REGARDING INCORPORATION OF ALL DCN'S INCORPORATED INTO THE SYSTEM.	I-M	OPEN
0137	1212	3/23/93	SOT 206 RL 6	CCTV	FGC	INSTALL CAMERA 11. RETEST PER 206.	I-S	DONE - WORK COMPLETED.
0138	1314	3/23/93	SOT RL 1	LOWER CUTTING SYSTEM	KBH	CRT NEEDS TO BE COMPLETED.	II	OPEN
0139	1212	3/23/93	GJP	CCTV	GJP	DESIGN/FABRICATE REMOVABLE MOUNTINGS FOR CCTV CAMERAS.	II	OPEN
0140	1352	3/28/92	SOT 503 RL 1	OFF NORMAL STATION	TGM	COMPLETE DATA PACKAGE OPEN ITEMS.	II	CLOSED - ALL ITEMS COMPLETE.
0141	1352	3/28/92	SOT 503 RL 2	OFF NORMAL STATION	CRC	COMPLETE CRT TESTING OF FAT.	II	CLOSED - SEE 0178.
0142	1211	3/28/92	LTR 2272	CONTROL SYSTEM	IJZ	DEVELOP REMOVABLE PROTECTION FOR CABLES THAT ARE EXPOSED IN THE TEST CELL.	II	OPEN
0143	1324	3/28/92	FAT	ROD LOADING	FGC	NEED UPPER AND LOWER HARD STOPS.	I-S	CLOSED - HARD STOPS ARE NOT TO BE PROVIDED. NOT REQUIRED.
0144	1311	3/28/92	TRIAL RUN	FUEL ASSEMBLY STORAGE RAC	FGC	REORIENT LOAD CELL REMOVAL TOOL	II	OPEN

0145	1212	3/28/92	RL 16	CONTROL SYSTEM	GJP	RESOLVE VCR-5 PLAY BACK IMAGE.	II	OPEN
0146	1211	3/28/92	RL 5	CONTROL SYSTEM	GJP	RESOLVE SCREEN ADDRESS PROBLEMS FOR VCR #1/CAMERA 4/17 OVERLAP.	I-N	DONE - 5/01/92. WORK COMPLETED.
0147	1212	3/28/92	RL 15	CCTV	KTG	REVISE SCREEN PROCEDURE TO IDENTIFY CONSOLE VCR 1&2.	I-M	DONE - WORK COMPLETED.
0148	1322	3/28/92	WALKDOWN	ROD EXTRACTION	EBF	THE CARRIAGE DRIVE MOTOR ELEVATIONS NEED TO GO HIGHER TO ACCOMMODATE THE CONNECTORS ON THE CABLE MANAGEMENT SYSTEMS. NEED TO PROGRAM SOFTWARE TO POSITION LOAD CELL REMOVAL TOOL FOR LOAD CELL REMOVAL OPERATIONS.	I-F	DONE - WORK COMPLETED.
0149	1311	3/28/92	TRIAL RUN	FUEL ASSEMBLY STORAGE RAC	FGC	THE RAKE DOES NOT DROP FAR ENOUGH BELOW THE SMALLEST FUEL RODS.	II	OPEN
0150	1323	3/28/92	FAT 1323	ROD COMPACTION	FGC	THE SIDE WEIGHT RAILS ARE TOO HEAVY AND DO NOT EVENLY REST ON THE RODS AT THE FOUR LOCATIONS.	I-F	DONE - WORK COMPLETED.
0151	1323	3/28/92	FAT 1323	ROD COMPACTION	FGC	PREPARE/RUN SOT'S ON FIRE DETECTORS, RADIATION MONITORS, AND SEISMIC MONITOR.	II	OPEN
0152	1212	3/28/92	DOE STAT RPT	CCTV	GJC	DESIGN, FAB, INSTALL BRACKETS FOR TV CAMERA CHANGE OUT.	II	CLOSED - DUPLICATE 0139.
0153	1212	3/28/92	GUY	CCTV	GJP	RETEST CLAMP JAW OPENING.	I-S	DONE - RETEST 3/09/92 EBF.
0154	1352	4/15/92	SOT RL #3	OFF NORMAL STATION	EBF	FIX CAMERA 12 AND RETEST.	I-S	DONE - 5/01/92.
0155	1331	4/15/92	SOT 206 RL 6	FUEL CANISTER UPENDER	FGC			

0156	1312	4/15/92	SOT 203 RL 2	DOWNENDER	TFM	COMPLETE QA/QC DATA PACKAGES.	I-N	CLOSED - SEE TFM MEMO 92-C-67 DATED 8/12/92.
0157	1318	4/15/92	SOT 205 RL 1	FUEL ASSEMBLY HANDLING	TFM	COMPLETE QA/QC DATA PACKAGES.	I-N	OPEN - CONTRAVES PORTION COMPLETE. PT&G PORTION BEING EVALUATED.
0158	1312	4/15/92	SOT 203 RL 1	DOWNENDER	KBH	COMPLETE CRT.	II	OPEN
0159	1331	4/15/92	SOT 206 RL 5	FUEL CANISTER UPENDER	FGC	DOE MODIFY SQUARE CANISTER LID.	I-N	DONE - 5/01/92. WORK COMPLETED.
0160	1321	4/15/92	G. COLE	CLAMPING TABLE	EBF	RESOLVE LOW CLAMPING FORCE WITH PWR CLAMP.	I-S	DONE - CLAMPING FORCE DETERMINED TO BE ADEQUATE.
0161	1341	4/15/92	F. GALLO	MFBC LOADER	KTG	MAKE SOFTWARE CHANGE TO ELIMINATE LOAD CELL AND PROVIDE FOR HOLD POINTS WHEN SKELETON IS SET ON TABLE AND WHEN FAHF IS LIFTED CLEAR.	II	OPEN
0162	1321	4/15/92	G. COLE	CLAMPING TABLE	GJC	MODIFY RESOLVER RATIO FOR BUR/PWR CLAMP POSITIONS.	I-S	DONE
0163	1321	4/15/92	P. JUDD	CLAMPING TABLE	FGG	DESIGN/FABRICATE PWR TEST FIXTURE FOR CLAMPING TABLE (ROW INDEXING).	I-S	DONE
0164	1322	4/16/92	FAT RL 1	ROD EXTRACTION	EBF	TEST CABLE MANAGEMENT SYSTEM WITH FULL RANGE OF CARRIAGE MOTION PRIOR TO SOT.	I-S	DONE
0165	1322	4/16/92	FAT	ROD EXTRACTION	EBF	CAPTIVE BOLTS FOR PULL HEADS WHEN BEING LOOSEMED CAN ENGAGE THE BACK PLACE OF THE PULL HEAD. THREAD LENGTH OF BOLT IS LONGER THEN THE SEPARATION. EVALUATE THE NEED FOR UPPER BUR	II	OPEN - DONE FOR W 17X17 ONLY FOR REFOCUSED TESTING.
0166	1321	4/22/92	GALLO	CLAMPING TABLE	FGG	EVALUATE THE NEED FOR UPPER BUR	II	OPEN

CLAMPS.

0167	1321	4/22/92	GALLO	CLAMPING TABLE	FGG	ADD LOAD CELLS TO BUR CLAMP ARRANGEMENT.	11	OPEN - ALL PARTS MADE ASSEMBLY - 60% COMPLETE.
0168	1321	4/22/92	GALLO	CLAMPING TABLE	FGG	ADD BRACKETS FOR TWO EXTRA WIRES FOR PWR CLAMP (MAY NOT BE NEEDED IF BUR UPPER CLAMPS ARE NOT REQUIRED).	11	OPEN - BRACKETS ADEQUATE FOR REFOCUSSED TESTING.
0169	1321	4/22/92	GALLO	CLAMPING TABLE	FGG	ADD CABLE SUPPORT TREE.	11	OPEN
0170	1315	4/23/92	QA REVIEW	LOWER CUTTING SYSTEM	TFM	COMPLETE ASSEMBLY PROCEDURES SECTIONS 3.5.1.8, 3.5.4.1-5, AND 3.5.5.1-3, WHICH ASSEMBLE THE CHIP COLLECTION HOPPER.	11	OPEN
0171	1312	5/04/92	DATA PACKAGE	DOWMENDER	KBH	COMPLETE DCN 823 MAKE NEW VENT PLUG FOR MAIN DRIVE GEAR BOX.	11	CLOSED
0172	1312	5/04/92	DATA PACKAGE	DOWMENDER	KBH	COMPLETE DCN 707 PROVIDE TRUNION FOR DRIVE ASSEMBLY.	11	OPEN
0173	1312	5/13/92	FAT RL4	DOWMENDER	EBF	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0174	1324	5/13/92	FAT RL1	ROD LOADING	EBF	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0175	1322	5/13/92	FAT RL2	ROD EXTRACTION	EBF	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0176	1313	5/18/92	FAT RL5	STAGING AND CUTTING	EBF	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	CLOSED - SEE ITEM 0122.
0177	1321	5/18/92	FAT RL2	CLAMPING TABLE	EBF	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN

0178	1352	5/18/92	FAT RL1	OFF NORMAL STATION	EBF	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0179	1342	5/18/92	FAT RL2	MFBC UPENDER	EBF	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0180	1331	5/18/92	FAT RL1	FUEL CANISTER UPENDER	EBF	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0181	1316	5/18/92	FAT RL4	FINES COLLECTION SYSTEM	KBH	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0182	1351	5/18/92	FAT RL1	WASTE CONTAINER TRANSFER	KBH	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0183	1315	5/18/92	FAT RL2	LOWER CUTTING SYSTEM	KBH	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN - SEE ITEM 0138.
0184	1314	5/18/92	FAT RL14	UPPER CUTTING SYSTEM	KBH	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0185	1323	5/18/92	FAT RL4	ROD COMPACTION	EBF	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0186	1341	5/18/92	FAT RL1	MFBC LOADER	EBF	RESOLVE COMPONENT REPLACEMENT TEST PERFORMANCE.	11	OPEN
0187	1214	6/15/92	SOT RL 3	RBT	GJP	APPROVAL FOR TCM 002.	1-S	CLOSED - APPROVED BY DOE LETTER DATED 7/10/92.
0188	1321	6/15/92	SOT RL 12	CLAMPING TABLE	EBF	APPROVAL FOR TCM 004.	1-S	CLOSED - DOE LETTER 7/10/92 APPROVED.

0189	1352	6/15/92	TAC 503	OFF NORMAL STATION	EBF	APPROVAL FOR TCM 002.	11	CLOSED - APPROVED BY DOE LETTER DATED 7/10/92.
0190	1318	6/15/92	QA REVIEW	FUEL ASSEMBLY HANDLING	EBF	PERFORM UT ON SHAFTS.	11	CLOSED - NEW SHAFTS WERE PROVIDED.
0191	1318	6/15/92	TAC 205	FUEL ASSEMBLY HANDLING	EBF	APPROVAL FOR TCM 002.	1-S	CLOSED - APPROVED BY DOE LETTER DATED 7/10/92.
0192	1215	6/15/92	TAC 214	MANIPULATOR TRANSPORTER	EBF	APPROVAL FOR TCM 003.	11	CLOSED - APPROVED BY DOE LETTER DATED 8/04/92.
0193	1321	6/15/92	SOT RL 10	CLAMPING TABLE	EBF	APPROVAL FOR TCM 002.	1-S	CLOSED - DOE LETTER 7/10/92 APPROVED.
0194	1321	6/15/92	SOT RL 11	CLAMPING TABLE	EBF	APPROVAL FOR TCM 003.	1-S	CLOSED - APPROVED BY DOE LETTER 7/10/92.
0195	1324	6/15/92	FGG	ROD LOADING	EBF	MAKE MODIFICATION TO ROD PUSHER TO INCREASE EXTENSION LENGTH .5 INCH TO PERMIT INSTALLING THE CANISTER LID./	1-S	CLOSED - COMPLETED WORK.
0196	1314	6/15/92	FGG	UPPER CUTTING SYSTEM	KBH	INSTALL STRIKER PLATE FOR ID TUBE CUTTER.	1-S	CLOSED - COMPLETED WORK.
0197	1322	6/15/92	FGG	ROD EXTRACTION	EBF	ADD WEIGHTS TO ROD EXTRACTION CABLE MANAGEMENT SYSTEM.	1-S	CLOSED - COMPLETED WORK.
0198	1314	6/15/92	FGG	UPPER CUTTING SYSTEM	KBH	COMPLETE ASSEMBLY.	11	OPEN - COMPLETED ASSEMBLY FOR REFOCUSED TESTING.
0199	1316	6/15/92	FGG	CHIP COLLECTION	GJC	INSTALL HOPPER FOR UPPER CUTTING SYSTEMS. INSTALL CHIP COLLECTION PUMP, PIPING, AND STORAGE TANK.	1-S	CLOSED - 8/31/92.

0201	1211	6/17/92	DOE	CONTROL SYSTEM	TJZ	APPROVAL FOR TCM 002 OF TAC 601.	I-M	OPEN - REVISION SENT TO DOE ON 9/11/92.
0202	1211	6/17/92	DOE	PROCESS CONTROL	TJZ	APPROVAL FOR TCM 004 OF TAC 601.	I-M	OPEN - REVISION SENT TO DOE ON 9/11/92.
0203	1211	6/17/92	KTG	PROCESS CONTROL	KTG	CORRECT PROBLEMS WITH FUNCTION KEYS FOR ACCOUNTABILITY SYSTEM.	I-M	OPEN - IN PROGRESS ON 9/09/92.
0204	1212	7/23/92	FGG	CCTV SYSTEM	FGG	RESOLVE CAMERA LOCATION/CALLUP TO VIEW RELEASE OF RODS BY BRIPPERS.	I-M	CLOSED - EXISTING CAMERA CALL UP WILL VERIFY IF ALL RODS ARE RELEASED.
0205	1331	7/23/92	TEST 207	FUEL CANISTER UPENDER	FGG	RESOLVE PROBLEMS WITH FUEL CANISTER CLAMP NOT FUNCTIONING PROPERLY.	I-M	CLOSED - 8/31/92.
0206	1331	7/23/92	TEST 207	FUEL CANISTER UPENDER	KTG	ESTABLISH SET POINT FOR FCU DRIVE TO LOAD POSITIONS.	I-M	CLOSED - 8/31/92.
0207	1311	7/30/92	SOT-RL #4	FUEL ASSY. STG. RACK	KTG	ISSUE DCN TO CONTROL SYSTEM SOFTWARE TO CORRECT SET POINTS ON LOAD CELL 2C.	I-M	OPEN
0208	1321	7/30/92	SOT 202	CLAMPING TABLE	VNC	ISSUE TCM 007 AGAINST TAC 202 AND RECEIVE DOE APPROVAL.	I-M	CLOSED - COVERED BY ITEM 210.
0209	1312	7/30/92	SOT 203	DOWNENDER	KBH	ISSUE TCNS 001 AND 002 AGAINST TAC 203 FOR DOE APPROVAL AND RECEIVE APPROVAL.	I-M	CLOSED - TCNS 001 AND 002 APPROVED BY DOE LETTER OF 8/21/92.
0210	1321	7/31/92	SOT 202	CLAMPING TABLE	VNC	APPROVAL OF TCM 007 TO TAC 202 REV. 2 AND TPCN 010 TO TP 202.	I-M	TCN 007 AND TPCN 010 APPROVED BY DOE LETTER DATED 8/19/92.
0211	1323	7/30/92	SOT 207	ROD COMP/LOADING	VNC	RECEIVE APPROVAL FOR TCNS 001	I-M	CLOSED - APPROVED BY DOE LETTER

DATED 8/04/92.

AND 002 AGAINST TAC 201.

0212	1312	7/31/92	FGG	DOWENDER	FGG	MODIFY MOTOR COUPLERS TO FACILITATE REMOTE REMOVAL.	11	OPEN - APPROXIMATELY 80% COMPLETE.
0213	1321	7/31/92	FGG	CLAMPING TABLE	FGG	MODIFY MOTOR COUPLER TO FACILITATE REMOTE REMOVAL.	11	OPEN - APPROXIMATELY 80% COMPLETE.
0214	1322	7/31/92	FGG	ROD EXTRACTION	FGG	MODIFY MOTOR COUPLER TO FACILITATE REMOTE REMOVAL.	11	OPEN - APPROXIMATELY 80% COMPLETE.
0215	1323	7/31/92	FGG	ROD COMPACTION	FGG	MODIFY MOTOR COUPLER TO FACILITATE REMOTE REMOVAL.	11	OPEN - APPROXIMATELY 80% COMPLETE.
0216	1324	7/31/92	FGG	ROD LOADING	FGG	MODIFY MOTOR COUPLER TO FACILITATE REMOTE REMOVAL.	11	OPEN - APPROXIMATELY 80% COMPLETE.
0217	1324	7/31/92	FGG	ROD LOADING SYSTEM	FGG	MODIFY MOTOR COUPLER TO FACILITATE REMOTE REMOVAL.	11	OPEN - APPROXIMATELY 80% COMPLETE.
0218	1341	7/31/92	FGG	WFBC LOADER	FGG	MODIFY MOTOR COUPLER TO FACILITATE REMOTE REMOVAL.	11	OPEN - APPROXIMATELY 80% COMPLETE.
0219	1342	7/31/92	FGG	WFBC UPENDER	FGG	MODIFY MOTOR COUPLER TO FACILITATE REMOTE REMOVAL.	11	OPEN - APPROXIMATELY 80% COMPLETE.
0220	1331	7/31/92	FGG	FUEL CANISTER UPENDER	FGG	MODIFY MOTOR COUPLER TO FACILITATE REMOTE REMOVAL.	11	OPEN - APPROXIMATELY 80% COMPLETE.
0221	1324	7/31/92	DATA PKG. REV	ROD LOADING	PVJ	ROUND HOPPER HAS NOT BEEN DELIVERED BY CONTRAVES.	11	OPEN - READY FOR SHIPMENT. NEED TO RESOLVE CONTRACTUAL MATTER.
0222	1324	7/31/92	TFM	ROD LOADING	KBH	VERIFY CRITICAL DIMENSION OF ZONE D-3 (8.500 - 1.005, -	I-M	CLOSED

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	ID	Date	TIM	Rod Extraction	TFM	Description	Status / Comments
0223	1322	7/31/92	TFM	ROD EXTRACTION		RESOLVE COMPLETION OF DCN-141 BY CUSA.	I-N CLOSED - SEE TFM MEMO 92-C-68 DATED 8/12/92.
0224	1600	8/01/92	PVJ	INTEGRATED SYSTEM TEST	PVJJ/DOE	GET DOE APPROVAL OF 9315-TAC-215A REV. 1.	I-M CLOSED - APPROVED BY DOE 8/14/92 W/ 2 COMMENTS. HNUIS ISSUED REV.2 ON 8/31/92 BY LTR.
0225	1600	8/01/92	PVJ	INTEGRATED SYSTEM TEST	PVJJ/DOE	ISSUE REV. 1 TO 9315-IST-215A IMMEDIATELY PRIOR TO IST. INCORPORATE DOE COMMENTS OF 7/13/92 LTR.	I-M OPEN - DOE LTR. OF 8/14/92 AGREED W/ THE HNUIS DISPOSITIONING OF DOE COMMENTS.
0226	1600	8/01/92	PVJ	INTEGRATED SYSTEM TEST	VNC/TJZ	ISSUE TWO SOP'S, EIGHT DOPS, & 1 ECP FOR VALIDATION INCORPORATING DOE COMMENTS AS APPROPRIATE.	I-M OPEN - HNUIS IS PREPARING A RESPONSE TO DOE COMMENT LTR. DATED 8/24/92.
0227	2000	8/03/92	GJP	GFE	EGG	RESOLVE SHORT RODS IN W-17X17 ASSEMBLY.	I-M CLOSED - RODS WERE SLID FORWARD TO BE EVEN AT THE UPPER END.
0228	1322	8/03/92	SOT-212-RL#5	ROD EXTRACTION SYSTEM	FGG	INSTALL 1 INCH PLUG IN GRIPPERS TO LIMIT INSERTION DEPTH TO 1.5 INCHES.	I-M CLOSED - 8/31/92.
0229	1322	8/03/92	SOT201 RL6-9	ROD EXTRACTION SYSTEM	KTG	ISSUE DCN TO SOFTWARE TO COVER CONTROL SYSTEMS SET POINT CHANGES FOR LOAD CELL, TIMEOUT OF FAULT SET POINTS FOR DRIVE MOTOR AND GRIPPER MOTORS. MOTOR AND GRIPPER MOTORS.	I-M CLOSED - DCN 38 ISSUED.
0230	1322	8/03/92	SOT-201	ROD EXTRACTION SYSTEM	VNC	ISSUE TCN-001 TO TAC-201 TO REVISE TAC FOR SPECIFIC ITEMS	I-M CLOSED - DOE APPROVAL LTR. DATED 8/21/92.
0231	1214	8/03/92	SOT-212 RL#5	RBT	GJ-P	TROUBLESHOOT CONTROL SYSTEM INTERLOCKS WITH CAMERAS 9 & 10 AND RETEST.	I-M OPEN - WORK DONE. NEEDS RETEST.
0232	1214	8/03/92	GJC	RBT	GJC	RESOLVE PROBLEM WITH VERTICAL POSITIONING OF THE RBT DIFFERENT BETWEEN JOG MODE AND AUTO (HARD SINGLE STEP) MODES. CAMERA NO. 12 NOT FUNCTIONAL. REPAIR AND RETEST SECTIONS	I-M CLOSED - SOFTWARE PROBLEM RESOLVED 8/07/92.
0233	1331	8/03/92	SOT-206 RL#6	FUEL CANISTER UPENDER			I-M CLOSED

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0234	1318	8/04/92	SOT-205 RL#4	PAR FUEL ASSY. HDLG. FIX.	FGG	8.1.8.1, 8.1.8.3, 8.1.8.5, AND 8.1.9.3. COMPLETE CCTV. RE RUN SOT-TP-205 SECTION 8.5.	I-M	CLOSED - 8/13/92.
0235	1318	8/05/92	SOT-205 RL#4	FUEL ASSY. HANDLING FIX.	DOE	APPROVE TCN 003 TO TAC 205 REV. 3.	I-M	CLOSED - TCN 003 APPROVED BY DOE LTR. DATED 8/21/92.
0236	1322	8/07/92	VN CHAPMAN	ROD EXTRACTION	FGG	RESOLVE DESIGN PULLING FORCE FOR PULL HEADS.	II	OPEN - CURRENT DESIGN ADEQUATE FOR W 17X17 1ST.
0237	1322	8/07/92	VN CHAPMAN	ROD EXTRACTION	VNC	COMPLETE TEST RESULTS AND ANALYSIS REPORT FOR ROD EXTRACTION SOT TESTING.	II	OPEN - NEED FOR FINAL REPORT.
0238	1322	8/07/92	VN CHAPMAN	ROD EXTRACTION	VNC	COMPLETE TESTING AS PER TPCN 4.	I-S	CLOSED
0239	1312	8/07/92	VN CHAPMAN	DOWNENDER	KBH	DETERMINE OR VERIFY THAT DOWNENDER BOTTOM SUPPORT SET POINTS AS ARE REQUIRED FOR CUTTING SYSTEM OPERATIONS 1 17X17 FUEL ASSEMBLIES.	I-M	CLOSED
0240	1215	8/07/92	VN CHAPMAN	MANIPULATOR TRANSPORTER	GJP	POSITION TO VERIFY THAT THE MANIPULATOR TRANSPORTER DOES NOT INTERFERE WITH CCTV CAMERA 3/S VIEW OF THE LOWER CLAMPING TABLE.	I-S	CLOSED - SEE ITEM 0052.
0241	1321	8/07/92	VN CHAPMAN	CLAMPING TABLE	VNC	REDESIGN LOWER CLAMPS TO OBTAIN ASSEMBLIES WITH 1.5" BOW.	II	OPEN - CURRENT DESIGN ADEQUATE FOR W 17X17 1ST.
0242	1321	8/07/92	VN CHAPMAN	CLAMPING TABLE	VNC	COMPLETE TEST RESULTS AND ANALYSIS REPORT FOR SOT TESTING.	II	OPEN - NEED FOR FINAL REPORT.
0243	1212	8/07/92	VN CHAPMAN	CCTV	KTG	REPROGRAM ROD EXTRACTING HOLD POINT CAMERAS 3 AND 7 (H.P. #182) AND 4 & 8 (H.P. #3). ALARM CAMERA CALL REMAINS 4&7.	I-S	CLOSED

0245	1312	8/11/92	VN CHAPMAN	DOWNENDER	KBH	DOWNENDER CARRIAGE FAILED TO HOME IN TESTING AS PER TP-202, TPCM TO REQUIRED TO COMPLETE TESTING.	I-S	CLOSED
0246	1312	8/17/92	QA DATA PKG.	DOWNENDER	TFM	COMPLETE ASSEMBLY STEP 3-2-2.46.	II	OPEN - INSTALL TRUNNION PAD.
0247	1321	8/19/92	VN CHAPMAN	CLAMPING TABLE	KTG	RESOLVE DISCREPANCY IN UP SETPOINTS FOR TABLE ELEVATION M1061 IN HAND AND AUTO MODES.	II	OPEN - DOES NOT IMPACT IST, WHICH IS DONE ON AUTO MODE; DOES IMPACT DQP-010A FOR HAND
0248	1314	9/09/92	TFM	UPPER CUTTING SYSTEM	KBH	COMPLETE DCM 555 ON UPPER HOPPER BASKET ASSEMBLY DWG. 9315-M-1659, REV. 1.	II	CLOSED - DWG. UPDATED, BUT WORK NOT IMPLEMENTED.
0249	1314	9/09/92	TFM	UPPER CUTTING SYSTEM	KBH	COMPLETE DCM 648 ON DWG. 9315-M- 1616, REV. 1 RELIEVE EAST FACE ON PIECE 7.	II	CLOSED - DCM VOIDED ON 9/09/92. NOT REQUIRED.
0250	1316	9/09/92	TFM	CHIP COLLECTION SYSTEM	KBH	COMPLETE DCM 515 ON DWG. 9315-M- 9103, REV. 0.	II	CLOSED - DWG. UPDATED, BUT WORK NOT IMPLEMENTED.
0251	1324	9/09/92	TFM	ROD LOADING SYSTEM	FGG	COMPLETE DCM 479.	II	CLOSED - WORK COMPLETE
0252	1324	9/09/92	TFM	ROD LOADING	FGG	COMPLETE DCM 879 - DRILL HOLES FOR LOCATING PINS.	II	CLOSED - WORK COMPLETE
0253	1331	9/09/92	TFM	FUEL CANISTER UPENDER	FGG	COMPLETE DCM 428 ON DWG. 9315-S- 3102 TO ADD SHIM PLATE.	I-M	CLOSED - VOIDED DCM 428 ON 9/09/92. NEW DCM TO BE ISSUED SHOWING AS BUILT CONDITION.
0254	1341	9/09/92	TFM	MFBC LOADER	FGG	COMPLETE DCM 786 TO INCREASE LENGTH OF FASTENER ON DWG. M- 2501/02/13.	II	OPEN - DCM 786 NOT TO BE COMPLETED UNLESS LOADER IS USED IN FUTURE TESTING.
0255	1342	9/09/92	TFM	MFBC UPENDER	FGG	COMPLETE DCM 844 TO ADD A	II	OPEN - DCM 884 NOT TO BE

0256	1342	9/09/92	TFM	NFBC UPENDER	FGG	COMPLETE DCN 488 TO ADD LOCATING PINS.	II	OPEN - DCN WILL NOT BE COMPLETED FOR PHASE III.
0257	1212	9/10/92	VNC	CCTV	GJP	RELOCATED CAMERA 8 FOR FULL VIEW OF GRIPPER AT THE DROP RODS HOLD POINT OR OTHERWISE RESOLVE INTERFERENCE PROBLEM.	II	OPEN
0258	1322	9/10/92	VNC	ROD EXTRACTION	VNC	REPAIR PROXIMITY SENSOR CABLE CONNECTOR ON PULLHEAD A.	II	OPEN
0259	1212	9/10/92	VNC	CCTV	GJP	EVALUATE BACKUP COVERAGE FOR CCTV CAMERA 8IN ROD EXTRACTION HOLD POINT. IS ANOTHER CAMERA REQUIRED?	II	OPEN
0260	1212	9/10/92	VNC	CCTV	GJP	FOR THE TAN FACILITY, CCTV CAMERA 3 MUST BE POSITIONED IN RESPECT TO THE MANIPULATOR TRANSPORTER SUCH THAT THE LOWER CLAMPS ON CLAMPING TABLE MAY BE REDESIGN PULLHEADS FOR CALIBRATION, INSERTION, LENGTH, ROD RELEASE, 160-200 LBS.	II	OPEN
0262	1322	9/10/92	VNC	ROD EXTRACTION	VNC	PROVIDE ROD DROP SUPPORT TO PREVENT DROPPED ROD CONTACT WITH ELECTRICAL COMPONENTS ON THE EAST END OF THE CLAMPING TABLE.	II	OPEN
0263	1322	9/10/92	VNC	ROD EXTRACTION	VNC	REWORK PULL HEAD DRIVE PROXIMITY SENSORS FOR PROTECTION IN PROGRAMMED OPERATING MODES.	II	OPEN
0264	1322	9/10/92	VNC	ROD EXTRACTION	VNC	WITH REDESIGN OF PULL HEADS, SET GRIPPER OVERTORQUE FAULT WINDOW TO AVOID OCCASIONAL FAULTS.	II	OPEN
0265	1322	9/11/92	VNC	ROD EXTRACTION	VNC	EVALUATE OBTAINING DESIGN EXTRACTION SPEED OF 181 IPM AVERAGE.	II	OPEN

END OF TABLE CAUSING COMPACTION
TO BE OFF. THIS IN TURN CAUSES
MISS COUNT & LOADING SEQUENCE
TO BE OFF BY 1.
ROD COUNTER NOT COUNTING THE
PROPER NUMBER OF RODS. COULD BE
CAUSED BY PROBLEM IDENTIFIED
ABOVE. THIS NEEDS TO BE CHECKED
OUT.

I-M OPEN

TAC CHANGE NOTICE

DATE: 8/4/92 CHANGE NOTICE NO. 001
TAC NO: 9315-TAC-201, REV.2
TITLE: System Operational Test Acceptance Criteria for Fuel
Rod Extraction System WBS 1.3.2.2

=====

TAC CHANGES AND REASON FOR CHANGE

1. . On Page 1, Acceptance Criteria 1.1.1, delete the criterion; "Drive motor torque is $\leq$ 10.5 lb-ft" and basis.
. On Page 2, Acceptance Criteria 1.3, delete the criterion; "Motor torque is $\leq$ 10.5 lb-ft" and basis.
. On Page 2, Test Entry 1.3, delete "motor torque"

REASON: Brushless servo-motor torque is not field measurable. Reference TAC 202, Change Notice 004.

2. On Page 3, Test Entry 1.5, revise the header to delete the first sentence so that the header reads only; "In hand mode, attempt to operate each drive as follows:"

REASON: To clarify the purpose of the test entry.

(If more space is needed, use additional sheets)

ENGINEER

W. M. Chapman 8/4/92

Date

QUALITY ASSURANCE

W. M. Chapman

8/4/92

Date

PROJECT MANAGER

P. V. J. J. J.

8/4/92

Date

TAC CHANGE NOTICE (Cont'd)

3. On Page 4, Acceptance Criteria 1.6, first two criteria, revise

FROM: . Pull head A and B extended.

. Gripper jaws on pull head A and B open.

TO: . Gripper Jaws on Pull Head A and B are open.

. Pull Head A and B extend.

. Gripper Jaws close.

REASON: . The gripper jaws are initially opened in the initial configuration process and are opened again at the end of each extraction cycle. Consequently, the jaws are already open at the beginning of each extraction sequence.

. The first step in the extraction sequence is the extension of the Pull Head drives.

. The next step is the closure of the grippers on the fuel rods.

The test procedure reflects this sequence.

4. On Page 6, Acceptance Criteria 1.8, continued, second criteria on page, revise to read; "A report is printed defining the fault condition."

REASON: The alarm report is printed automatically and not "when commanded by the operator".

CHANGE NOTICE NO: 001

TAC CHANGE NOTICE (Cont'd)

5. On Page 1, Acceptance Criteria 1.1.1, third criterion, revise

FROM: Peak Speed is 120 to 130 inches per minut.

TO: Rod extraction between the second and third hold points takes $\leq .97$ minutes with an average speed of ≥ 181 inches per minute

REASON:

- . Peak speed is not a critical parameter. The pull head carriage servo drive is tuned to operate smoothly and continuously without jerking. Speed is ramped up to a reasonable value, then ramped down at the end of travel.
- . Time is measured to obtain the average speed.
- . The average speed requirement is based upon the throughput analysis calculation (181 inches/minute) but the elapsed time is modified for the revised distance changed in Item 6 below.

6. On Page 1, Acceptance Criteria 1.1.1, first criterion, first item, revise

FROM: - front hold point is $6.0 \pm .25$ inches.

TO: - first hold point is $1.0 -.25/+1.0$ inches.

REASON: A six inch initial extraction would pull rods beyond the bottom grid for W 17 X 17 assemblies. These rods may not then be aligned to be pushed back in if the retry option is used for a missed rod. A one inch criteria is used as a conservative value which is readily detectable. For the W 17 X 17, W 15 X 15, and B&W 15 X 15 assemblies, up to about 2.5 inches could be pulled before reaching the end of the bottom grid.

CHANGE NOTICE NO: 001

TAC CHANGE NOTICE (Cont'd)

7. On Page 4, Acceptance Criteria 1.6, revise the first Hold Point's video image criterion
- FROM: Video images from cameras No. 7 and No. 8 are displayed...
- TO: Video images from cameras No. 7 and No. 3 are displayed...
- REASON: Camera 8 does not provide coverage suitable for the verification of the first hold point which verifies that all rods are being pulled. Camera 3 can provide a view of the Clamping Table upper end clamps from the West. If the Manipulator Transporter is correctly positioned, it can also provide a view of the lower end clamps. Camera 4, as initially programmed, cannot provide a clear view of the partially extracted rods.
9. On Page 4, revise the first hold point's coverage criterion
- FROM: Pan, tilt, and zoom are functional and both cameras can be positioned to achieve an unobstructed view of the lower clamp assembly on the clamping table.
- TO: Pan, tilt, and zoom are functional and both cameras can be positioned to verify the partial extraction of the rods.
- REASON: Clarify the criteria for function. Camera 3 can provide a view of the lower clamp assembly area while Camera 7 provides a better view at the upper clamp assembly area. Either or both cameras may be used for this verification.
10. On Page 4, Acceptance Criteria 1.6, revise the second Hold Point's video image criterion
- FROM: Video images from cameras No. 7 and No. 8 are displayed...
- TO: Video images from cameras No. 7 and No. 3 are displayed...
- REASON: Camera 8 does not provide coverage suitable for the verification of the second are-all-rods-extracted hold point. Camera 3 can provide a view of the Clamping Table upper end clamps from the West. Camera 4, as initially programmed, cannot provide a clear view of the East end of the clamped fuel assembly to see if all rods are fully extracted.

CHANGE NOTICE NO: 001

TAC CHANGE NOTICE (Cont'd)

11. On Page 4, revise the second hold point's coverage criterion

FROM: Both cameras can be positioned to achieve an unobstructed view of the pull head gripper/fuel rod interface.

TO: Both cameras can be positioned to verify the extraction of the rods or to count the remaining rods.

REASON: Clarify the criteria for function. Camera 3 can provide a view of the full Clamping Table surface while Camera 7 provides a better view at the upper clamp assembly area to see that all rods are fully extracted. Either or both cameras may be used for this verification.
12. On Page 4, Acceptance Criteria 1.6, revise the third Hold Point's video image criterion

FROM: Video images from cameras No. 7 and No. 8 are displayed...

TO: Video images from cameras No. 4 and No. 8 are displayed...

REASON: Camera 8 provides the only fixed-point coverage suitable for the verification of the third are-all-rods-released hold point. Camera 4 can provide a partial view of the grippers. Should Camera 8 fail, then the RBT's cameras 9 and 10 would be used as jog-mode back-up.
13. On Page 4, Acceptance Criteria 1.6, revise the third Hold Point's coverage criterion

FROM: Cameras (7 and 8) can be positioned to achieve an unobstructed view of the jaw/fuel rod interface.

TO: Camera 8 provides a view of the jaw/fuel rod interface sufficient to determine that all rods are released.

REASON: Camera 8 is the only camera positioned for verification of rod release. Camera 4 can provide a partial view of the grippers. Camera 8 can see all rods going to the grippers but coverage of the ends of a few northernmost jaws on the southern pullhead is obstructed.

CHANGE NOTICE NO: 001

TAC CHANGE NOTICE (Cont'd)

14. On Page 5, Acceptance Criteria 1.7.1, revise the third criterion

FROM: Each pull head grippers can accommodate a maximum of a 2.0 inch off-set of the end of the fuel rods.

TO: Each pull head gripper can accommodate a maximum of a 1.5 inch off-set of the end of the fuel rods.

REASON: Inserts are placed in each set of gripper jaws to limit the actual rod insertion into the grippers to 2.0 inches. These inserts are used to enable the reliable release of the rods after extraction. With the 1/2 inch design gripping insertion for non-off-set rods, a 1.5 inch off-set can be accommodated.

For intact fuel assemblies, the off-set (extension) due to growth or other problems is limited to the 3/4 inch (W 17 X 17) available between the aligned rods and the end fitting. The 1.5 inch criteria is double the actual requirement and will also accommodate the partial extraction of aligned rods to the first hold point at 1 inch.

For B&W 15 X 15 assemblies which may have off-set rods extending up to a maximum of 2 inches, rods extending beyond the 1.5 inch off-set accommodation could be pulled first in the JOG Mode as an off-normal recovery.

For GE 8 X 8, possible growth is limited to about two inches less spring compression. This may be slightly over 1.5 inches. However, because the lower end fitting is removed, over-extended rods may be pushed back slightly without difficulty.

Department of Energy

Idaho Field Office
785 DOE Place
Idaho Falls, Idaho 83401-1562

August 21, 1992

G. B. 8
Sub 4.7
Chen
DEC
Pgh

TFM

Sut. 201 Notker
TCN Tracking for

J. Chapman

Peter V. Judd
NUS Project
c/o Contraves-USA
620 Epsilon Drive
Pittsburgh, PA 15238

SUBJECT: Review of Halliburton NUS System Operation Test (SOT) Test
Acceptance Criteria (TAC) Change Notice (TCN) Number 001 for the Rod
Extraction System - AM/NP-WJM-92-48

REFERENCE: Halliburton NUS Corporation letter to DOE-ID, ED-DOE-PVJ-92-2425,
dated August 5, 1992

Dear Mr. Judd:

DOE-ID has reviewed the subject TCN and finds it acceptable. The TCN is
approved for implementation.

If you have further questions, please contact me (208/526-6668) or
Mr. D. C. Koelsch (208/526-5930).

Sincerely,

David C. Koelsch

for Walter J. Mings. Acting Chief
Civilian Rad-Waste Branch

cc: F. G. Gallo, NUS
J. H. Clark, EG&G

910 CLOPPER ROAD • P.O. BOX 6032 • GAITHERSBURG, MARYLAND 20877-0962 • (301) 258-6000

ED-DOE-PVJ-92-2425
August 5, 1992

Mr. W.J. Mings, Chief
Civilian Rad-Waste Branch
U. S. Department of Energy
Idaho Field Office
785 DOE Place MS-1136
Idaho Falls, ID 83401-1562

Subject: Contract DE-AC07-86ID12651 - Rod Consolidation Project
Systems Operational Test--Rod Extraction System -
Test Acceptance Criteria Change Notice (TCN) -
Approval

References: 1. 9315-TAC-201 Rev. 2 - Rod Extraction System

Dear Mr. Mings:

Attached is TCN-001 to reference 1 for your approval.

Enclosed with TCN-001 is a marked up copy of reference 1 to
facilitate review.

If you have any questions regarding this letter and its enclosures,
please contact the undersigned on (412) 967-7304.

Very truly yours,

Peter V. Judd
Project Manager

ht

ATTACHMENTS:

1. TCN 001 to TAC-201

cc: D.C. Koelsch - DOE-ID w/atts
J.H. Clark - EG&G w/atts

DEC: DEC - w/att - original
Subj U.I. - w/att
chron - w/out

Rjh DOE chron - w/out
Judd chron - w/out
T. Mulgrew - w/att
F. Gallo - w/att
U. Chapman - w/att (second copy)
S&P - 201 notebook - w/att
TCN Tracking Log - w/att

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APPENDIX I-4.2

CLAMPING TABLE

(WBS 1.3.2.1)

TEST RESULTS AND ANALYSIS REPORT

1.0 INTRODUCTION

This appendix addresses the System Operational Testing (SOT) for the Clamping Table (Ref. SOT Test Procedure 9315-TP-202). It provides an overview of the function of the equipment, procedures used during testing, results obtained, and conclusions and recommendations. The purpose of the SOT was to verify that the as-built condition of the system met or exceeded the associated performance requirements. The primary objectives of the testing were as follows:

- o Verification of Clamping Table top levelness and travel under loaded conditions.
- o Verification that the upper and lower clamping mechanisms function as designed.

In all cases, the Clamping Table has been judged acceptable and was released for normal Integrated System Testing (IST) with Westinghouse 17x17 mock-up fuel assemblies.

2.0 EQUIPMENT FUNCTION

The Clamping Table is provided for the support, positioning, and clamping of fuel assemblies during the rod extraction process. The station consists of an elevating table with programmable height adjustment. Removable clamps, positioning grids, and fuel assembly supports are mounted on the table. The table provides for the accurate positioning of the fuel assembly's rod rows as required for the engagement of the Rod Extraction System. The table can support either two PWR or four BWR fuel assemblies. The table is connected with the Crud Collection System for automated collection of crud dislodged from fuel rods during the extraction process. The table is designed to withstand a maximum pull force of 200 lbs. on every rod being extracted.

The Clamping Table consists of a fixed base and a movable table top. The base is a large structural weldment which supports two 5-ton capacity ball screw actuators that raise and lower the table top. The actuators are located on opposite ends of the base and are innerconnected by a drive shaft to allow both actuators to be driven by a common motor. The servo-drive motor (M-106I) is located on the west end of the base and is equipped with an integral brake and resolver. Proximity sensors are provided as end-of-travel protection.

The tabletop consists of a structural frame to which a steel plate is welded to form a top. The tabletop has a nominal 12 inches of vertical movement relative to the base. The tabletop is designed

to position the row of fuel rods being extracted for alignment with the rod extraction pull heads. Load cells are provided on the table top to sense the presence of fuel.

The tabletop is provided with a number of guide pins to be used to position various clamps, fuel supports, and fuel rod alignment guides. The top is equipped with a lower end fitting clamp mounted to the lower clamp X-axis slide, three fuel supports innerconnected by rails, and an upper grid clamp mounted to the upper clamp X-axis slide. The clamps or grids are provided to position and restrain the fuel assemblies. The clamp slides are provided for the correct positioning of the clamps and grids for the fuel assembly types.

The lower end fitting clamps (M-106C and M-106D) are used for all PWR fuel designs. The clamp actually features two independent clamp mechanisms. Each mechanism, as shown on Dwg. 9315-M-2112, has a drive motor which drives a ball screw. As the screw is turned, the jaws either close or open depending on the direction of screw rotation. Motor current limits prevent overtorquing.

The clamps are mounted to a common slide assembly. The slide can be installed on one of four sets of guide pins. From each set of guide pins, the lower clamp slide motor M-106B can move the clamps over a nominal 18 inches of travel. Thus, the position of the clamps is continuously adjustable over 60 inches, accommodating all PWR fuel lengths.

Three fuel supports are provided for each PWR fuel assembly. A removable rail, as shown on Dwg. 9315-M-2103, is placed to interconnect the supports. This ensures that the fuel assemblies are supported under grids. This also allows the supports to be placed in a single position for all PWR designs.

On the east end of the Clamping Table is another positioning slide very similar to the lower end fitting clamp slide. However, this slide has only one installation position. The clamp features a support saddle which supports and aligns the assembly at the second grid. The clamp rotates over and down onto the grid to prevent any vertical movement during rod extraction and to counteract any bowing of the fuel in the vertical direction. The saddle has removable inserts for the different fuel widths. The positioning slide allows the clamps to be correctly positioned over the clamped grid.

The tabletop configuration for BWR fuel features three fuel support saddles innerconnected by rails and rod alignment guides attached to the X-slide at the east end of the table. The fuel support saddles, shown on Dwg. 9315-M-2113, support the fuel assemblies and provide alignment. The guides have sides that catch the edges of

the grids. If a grid tends to slide during rod extraction, it will be restrained at the first support saddle. The rails between the saddles are similar to those used for the PWR fuel assemblies and ensure that the fuel assemblies are supported under the grids.

The fuel rod alignment guide provided for the BWR fuel is a temporary grid which is inserted into the fuel bundle adjacent to the uppermost existing grid and then repositioned near the exposed ends of the fuel rods. There are two BWR alignment guides that attach to the upper clamp slide. Each alignment guide aligns two BWR fuel assemblies. The guide consists of a single vertical slide mounted to a turn table. Extending from the vertical slide is a horizontal bar from which two sets of round rods extend vertically downward. Four of the rods in each set can be rotated 90 degrees about its vertical axis. The rods are rotated simultaneously by a motor driven rack, which mates with pinion gears attached to the rotating rods. The rack and motor are mounted to the top of the horizontal bar. The rotating rods have a series of short round rods installed perpendicular on spacings equaling the pitch diameter of the BWR fuel rods. The guides are designed to be inserted vertically between the rows of fuel rods and then the rotating rods rotated horizontally to form a grid. The vertical slide is required to be rotated about its vertical axis to allow setdown of fuel assemblies and removal of skeletons. This is accomplished by moving the upper clamp slide against stop pins, which force the rotation of the turntable.

3.0 TEST PROCEDURE

The record copy of the test procedure (Document No. 9315-TP-201) is provided as Attachment 1. This procedure defines the requirements and step-by-step instructions for qualifying the Clamping Table for the IST. This testing has been divided into the following sections for each of the five fuel types. Certain sections were only to be performed once since the differences across fuel types would not be significant.

- o Drive System Verification - This section verified the proper operation and machine/Control System interface for each of the drive systems for each fuel type.
- o Load Cell Verification - This section verified the proper operation and correct Control System response to each of the load cells for each fuel time.
- o Loading Verification for One Fuel Assembly - This section verified fuel assembly placement, fuel assembly alignment, and tabletop levelness with a fuel assembly in each table position for the heavier B&W 15x15 mock-up

fuel assemblies only.

- Loading Verification for Two Fuel Assemblies - This section verified fuel assembly placement, fuel assembly alignment, load deflection, and tabletop levelness with a fuel assembly in each table position for the heavier B&W 15x15 mockup fuel assemblies only.
- Rod Extraction System Interface - This section verified Clamping Table levelness in respect to the Rod Extraction pull heads for each fuel type.
- Clamping Table Interface Load Verification - This section verified that the Clamping Table can resist the extraction forces applied by the pull head drives under maximum expected loading. This testing was not to be repeated for each fuel type.
- Interlock Verification - This section verified the correct machine response to all of the software interlocks designed into the system for each fuel type.
- SINGLE Mode and AUTO Mode Verification - This section verified the proper sequence of operation and Control System part-program interfaces for each fuel type.
- Servo-Drive Fault Test - This section verified the proper operation of the equipment and Control System under failure conditions for each fuel type.

The test results and data for each of these test sections are contained within the record copy of the test procedure (Ref. Attachment 1). Section 4.0 of this volume provides a typical format for the test procedure and includes an explanation and reference as to the location of the test data included in the various sections of the test procedure. Completed test steps have been signed by appropriate personnel as required for final disposition of this SOT.

Two processes were implemented for making all necessary changes to the official test procedure and/or equipment. The first process is called a Temporary Procedure Change Notice (TPCN). The TPCNs were used to make changes to the test procedure. During this test, 25 TPCNs were issued as follows:

- TPCN #1 deleted testing which was not required for the verification of function for W 17x17 fuel assemblies as required in the refocused Phase III test program.

DOE PROTOTYPICAL ROD CONSOLIDATION PROJECT PHASE III FINAL REPORT

VOLUME I, APPENDIX I-4.2 TEST REPORT

PAGE 4.2-6

- o TPCN #2 deleted testing and test criteria related to torque measurements.
- o TPCNs #3, 4, 5, 6, 9, 11, 12, 14, 15, 16, 17, 18, 20, 21, 23, and 25 corrected errors in the test procedure.
- o TPCN #7 transferred RBT functional testing to the RBT test procedure. This TPCN was superseded by TPCN #10.
- o TPCN #8 performed functional alignment testing with the Rod Extraction System pull heads.
- o TPCN #10 was prepared to complete testing for this test procedure.
- o TPCNs #13, 19, and 22 were prepared, then voided.
- o TPCN 24 was prepared as a retest procedure.

Each TPCN identified the change, reason for change, and final disposition for approval of the test results. A copy of each TPCN is included in Attachment 1.

The second process is an Exception/Repair Log (ERL). The ERLs were used to document either fixes to the equipment to meet acceptance criteria or to justify acceptance of the test results that did not meet the test criteria. For this test, 49 ERLs were issued as follows:

- o ERLs #1 and 2 were issued to deal with prerequisite issues.
- o ERLs #4, 5, 6, 7, 8, 10, 11, 12, 13, 16, 21, 23, 24, 27, 28, 35, 36, 38, and 40 were issued to accept test results that did not meet the acceptance criteria.
- o ERLs #14, 15, 18, 19, 22, 25, 26, 31, 32, 34, 41, 42, 43, 44, 45, 46, and 48 were issued to implement fixes to the equipment to meet the acceptance criteria.
- o ERLs #3, 9, 17, 20, 29, 30, 33, 37, 39, 47, and 49 were issued to address procedural problems.

Each of these ERLs identified a problem encountered during testing, the proposed solution to the problem, and the final disposition (accept as is or fix) to close out the ERL. A copy of each ERL is included in Attachment 1.

If a change to the acceptance criteria was required, a Test

Acceptance Criteria (TAC) Change Notice (TCN) was issued against the TAC document. A TPCN would then be issued to reflect changes to the procedure. For this procedure, seven TCNs were issued against the TAC. The TCNs issued against the TAC documents can be found in the Test Section of the QA Records Package, which is a Phase III deliverable.

4.0 TEST RESULTS

The design and operating parameters for the Clamping Table are dependent on both the type of fuel being processed and manufacturer of the fuel. However, due to the restructuring of the test program, only those sections (Ref. TPCN #1) required to qualify this equipment for processing W 17x17 fuel assemblies were performed.

- o Drive System Verification - Section 8.3.1 for W 17x17 verification of the proper operation and machine/Control System interface for each of the drive systems was performed.
- o Load Cell Verification - Section 8.3.2 was to be performed to verify the proper operation and correct Control System response for each of the load cells. This section was not performed in initial testing, but the criterion was demonstrated in TPCN #23 testing.
- o Loading Verification for One Fuel Assembly - Section 8.1.3 was performed for the heavy B&W 15x15 mockup fuel assembly only.
- o Loading Verification for Two Fuel Assemblies - Section 8.1.4 was performed for the heavy B&W 15x15 mockup fuel assemblies only.
- o Rod Extraction System Interface - Section 8.3.3 for W 17x17 fuel assemblies was performed to verify Clamping Table levelness in respect to the Rod Extraction pull heads.
- c Clamping Table Interface Load Verification - Section 8.1.6 was performed to verify that the Clamping Table can resist the extraction forces applied by the pull head drives.
- o Interlock Verification - Section 8.3.4 was performed to verify the correct machine response to all of the software interlocks designed into the system for W 17x17 fuel assemblies.

- o SINGLE Mode and AUTO Mode Verification - Section 8.3.5 verified the proper sequence of operation and Control System part-program interfaces for W 17x17 fuel assemblies.
- o Servo-Drive Fault Test - Section 8.3.6 verified the proper operation of the equipment and Control System under failure conditions for W 17x17 fuel assemblies.

The following section provides a discussion of the results obtained during this SOT.

Prior to initiating this test, a list of prerequisites had to be satisfied (Ref. Section 2.0 of Attachment 1). These prerequisites identified all of the requirements for initiating this test sequence and served as an informal Operational Readiness Review (ORR).

As a result of this informal ORR, it was determined that all of the requirements except two had been satisfied.

- o The SOT for the BWR Fuel Assembly Handling Fixture (FAHF) had not been completed. Based on an evaluation of the system by the test conductor and a review of the subsequent prerequisites by the review committee, it was determined that the BWR FAHF was not required in the refocused Phase III test program. TPCN #1 was issued to delete the requirement that the BWR FAHF be tested.
- o CCTV camera 7 was not installed at the start of testing (Ref. ERL #1). Based on an evaluation of the system by the test conductor and a review of the subsequent prerequisites by the review committee, it was determined that initial testing could be performed without the camera being installed. The camera would be tested separately.

Therefore, testing of Clamping Table was initiated.

4.1 DRIVE SYSTEM VERIFICATION (SECTION 8.3.1)

This test sequence consisted of operating each drive system through its programmed range of motion. The purpose of this test sequence was to verify that each of the drive systems functioned as designed. The primary objective was to demonstrate the positioning accuracy and repeatability of these drive systems in meeting their requirements. Secondary operating parameters of torque, levelness, and travel time were also to be evaluated as applicable to the drive. Generally, three repetitions were performed to demonstrate

repeatability.

Torque measurements were to be obtained where applicable. However, the power monitor used to measure the drive system torque became suspect during testing other systems. When the manufacturer of this device was contacted about the problem, it was learned that the power monitor would not work on brushless pulse width modulated motors such as those used in this design. Therefore, all torque data collected were not valid. Further conversation revealed that no instrumentation existed which could be used for this purpose. An engineering evaluation was conducted as a result of this new information to determine the importance of measuring this parameter. It was decided that all problems with the drive systems would be flushed out since the drive systems were conservatively sized, were being tested under loaded conditions, and were being tested under simulated conditions. Therefore, the criterion to measure the motor torques was eliminated from the test procedure (Ref. TPCN #2).

The test sequence for verifying the operation of each of the drive systems for the Clamping Table was similar. Each drive system was placed in the HAND mode of operation and operated from control set point to set point in each direction of travel. During these operations, the distance traveled and the elapsed time to complete the move (when applicable) were measured and recorded in the test procedure (Ref. Attachment 1). In subsequent testing, some range of travel demonstrations were performed in the JOG mode to overcome programmed set point limitations. The results of this testing for each of the drive systems are as follows:

4.1.1 Clamping Table Elevation Drive M-106I (Section 8.3.1.1)

The unloaded testing of the Clamping Table elevation drive M-106I was initially performed only once as per Section 8.3.1.1. Subsequent retesting demonstrated three repetitions under unloaded conditions.

Testing of the Clamping Table elevation drive M-106I sought to demonstrate the following specific acceptance criteria.

- o Unloaded Clamping Table corner measurements were within ± 0.09 inch of each other at varying set point elevations, thus reflecting table levelness. (Tabletop remains horizontal within ± 0.09 inch of true horizontal plane.)

The Clamping Table elevation was driven to each rod row elevation set point in the HAND mode, and elevation measurements were obtained at each corner of the table.

Subsequent testing included the fully up position. The down position is the rod row 1 position in HAND mode operations.

Initial testing as per section 8.3.1.1 was performed to demonstrate this design criterion. ERL #3 was prepared to address measurement problems using a tape measure, and a new reference plane was established so that calipers could be used. A retest was performed for the initial steps, and testing was continued to complete the section.

In initial testing, the table was initially positioned in the row 1 (down) position in the HAND mode, and elevation measurements were obtained at each corner of the table. The table was then indexed up by the rod row incremental set point a recorded total of 19 times and the corner measurements were repeated. Testing demonstrated this criterion for this section.

Testing re-visited this criterion due to difficulties encountered in initial testing of table levelness under loaded conditions. Initial testing had presented a measurement problem that could have been caused by slippage in the reference plane set up in initial testing. TPCN #10 was prepared to eliminate this potential source of error among others. Testing was performed using elevation measurements made by tape measure to a fixed spot on the floor under each corner of the table. An unvarying methodology was used to minimize human error in measurements.

TPCN #10 sought to take measurements at the full up, the row 1, the row 8, and the row 17 elevations over three repetitions. The measurements at the other rod row set points were deleted as being excessive for the purposes of this demonstration. TPCN #10 also sought to record the Control System position indications for Clamping Table elevation.

Testing identified that the down indicating light was not illuminated on the control screen when the table was lowered to the row 1 position. It was expected that the light would be illuminated at this point when the test was prepared. ERL #38 was subsequently prepared for this discrepancy. However, it was not functionally required that this light be illuminated at row 1 since the row indication was sufficient for position feedback information. There were no specific criteria or objectives related to this indication.

Testing continued without addressing this issue at this time. Subsequently, a small adjustment in the row 1 set point brought the elevation set point within range for the down set point and the issue was closed. The down light is now illuminated at row 1.

Testing was performed through the first repetition until the Clamping Table was indexed to the up position from row 17. It was not clear at the time of TPCN #10 preparation whether or not there would be a difference between row 17 and the up position. It was developed as if there was a difference. The up position is the set point position for the interface with the RBT for fuel assembly placement and fuel assembly skeleton removal and is actually slightly higher than the row 17 elevation.

Testing determined that, in the HAND mode, the software did not allow reaching this set point position. The HAND mode software incremented up a fixed rod row elevation, and this fixed increment did not match the distance to the up set point. In the HAND mode, incrementation can be performed up to row 18. When incrementation was attempted up to row 19, the system faulted at proximity sensor end-of-travel. It was impossible to get to the up set point in the HAND mode in the current software design. This was not a problem for the AUTO mode, which did go to the up set point. Therefore, no immediate corrective action was required.

ERL #35 was prepared to document this discrepancy. TPCN #20 was prepared to supplement the test procedure as a clarification of how testing was to be performed to reach the up position. The restore process was subsequently used whenever it was necessary to go to the up set point while testing in the HAND mode. Initial testing for this criterion was repeated.

Testing proceeded through three repetitions and indicated that the Clamping Table remained level within ± 0.09 inch at varying set point elevations in unloaded conditions. Testing also demonstrated that the Clamping Table elevation set points were repeatable within the limits of measurement error. Retesting of the AUTO mode up set point was required to demonstrate that the up position also was repeatable.

- o Clamping Table vertical motion covers a range of 11.62 ± 0.15 inches.

Test Acceptance Criteria (TAC) Change Notice 001 added the bracketing " ± 0.15 " inch to the TAC.

Initial testing as per Section 8.3.1.1 was performed in the HAND mode, which operated at set point elevations appropriate to the specific fuel type. The table elevation was lowered to the row 1 position and then indexed up 19 times. This testing obtained corner elevation data ranging from 11.776 inches to 11.809 inches. These simple elevation data were used in comparison to the criterion. ERL #5 stated that the criterion's tolerance could not be demonstrated. The exception suggested accepting the data. The exception was completed based on the fact that testing as per Section 8.3.3 subsequently demonstrated that the range of travel was functionally adequate.

Testing was subsequently performed to redemonstrate this criterion in the JOG mode. JOG mode operations allowed for the range of travel permitted by the proximity sensors. The HAND mode operations in previous testing did not provide the full range of travel because travel was limited to those set points available for the specific fuel type. Actual HAND mode range of travel from up to row 1 position was measured to be a little over 8 inches. This was sufficient for the alignment of the W 17x17 fuel rod rows. Testing drove the Clamping Table between its end-of-travel limits and measured the distance traveled.

Testing as per TPCN #10, Step 8.1.3.16 obtained a range of travel of 11.95 inches, which exceeded the criterion's range. ERL #27 was prepared for this discrepancy. The " ± 0.15 " was added by TAC Change Notice 001 to provide measurement bracketing. This addition was inappropriate for this criterion. The original wording addressed a minimum range of travel. The design range of travel was nominally 12 inches. The minimum range of travel of 11.62 inches was demonstrated.

- o Clamping Table can transverse the vertical range of travel in ≤ 1.3 minutes.

Note that TAC Change Notice 001 revised the TAC's criterion from "less than" to "less than or equal to".

Testing as per Step 8.3.1.1.7 was performed for the initial demonstration of this criterion. The Clamping Table was lowered from a raised elevation to the row 1

position in the HAND mode and the travel time was recorded. An initial time of 106.5 seconds was observed, which is more than the 78 seconds allowed. The motor speed was increased so that a repeated test obtained 49.0 seconds over an apparent distance of about 7.684 inches. When calculated over the design range of 11.62 inches, the resulting time would be 74.1 seconds, which is less than the criterion's limiting 78 seconds.

However, this initial testing yielded an apparent speed of 9.41 inches per minute. The speed used in the time study analysis calculation was 9.76 inches per minute. Subsequent testing informally measured the table lowering time in the HAND mode. The total raising time was not measured through the available travel range due to the multiple intermediate rod-row set points. Consequently, the indexing time in table elevation was informally noted. Distance data was recorded from the elevation indications.

The process control time observed to lower the Clamping Table from 11.512 to 3.306 inches in the HAND mode was observed to be 118.01 seconds. This was from the start of process with the actuation of "GO" to the completion of the process with the illumination of row 1. The time study analysis used 0.80 minute (48 seconds) as a time estimate for this operation.

The process control time observed to index the Clamping Table up in the HAND mode was observed to be 21.94 seconds for an indicated nominal 0.489 inch. This was from the start of process with the actuation of "GO" to the completion of the process with the illumination of the next row number. The time study analysis used 0.06 minute (3.6 seconds) as an estimate for this operation.

The physical time in travel was not measured but was significantly less. Several seconds were involved in process control operations before and after the actual travel was performed. It was not clear that the observed HAND mode times would be applicable to AUTO mode timing, and the impact of the Process Control System delays for normal processing could not be evaluated from these data alone. AUTO mode timing was not obtained in this re-testing.

These data, if applicable to AUTO mode operations, would suggest that rod extraction processing time may be increased by a little over 6 minutes per set of fuel

assemblies due to the longer-than-expected Clamping Table operations. However, due to the uncertainty about potential differences between AUTO and HAND mode Control System timing, no attempt was made to further increase the speed at which the Clamping Table operated. Actual AUTO mode timing will be measured during the performance of the IST.

The Time Study Analysis did not include time estimates for operation of the Clamping Table's clamps or for the indexing of the table to the UP position after completion of extraction operations. Time measurements were not made for these operations in this testing. Slide positioning occurred before processing began and would have no direct impact for processing W 17x17 fuel assemblies.

Initial testing demonstrated the initially specified criterion adequately to enable the IST. The Clamping Table can traverse the vertical range of travel in ≤ 1.3 minutes.

- o The Clamping Table indexes rod row increments of 0.496 ± 0.01 inch for Westinghouse 17x17 fuel assemblies.

Initial testing as per Section 8.3.1 was performed to demonstrate this criterion. The table elevation was indexed up over the available rod row set points, and elevation measurements were obtained at each set point.

There were some procedural problems in performing this initial testing. The 0.496 ± 0.01 criterion was not met in all cases. Some data were out of tolerance by 0.004 inch. This was attributed to measurement error. ERL #4 was prepared to accept as is. The exception was dispositioned that testing as per Section 8.3.3 (TPCN #8) functionally verified that rod alignment was adequate.

Testing of Section 8.3.3 was revised with a test fixture (alignment gauge) which demonstrated this design elevation criterion by alignment function. If a test rod in the gripper (with radius 0.01 inch smaller than the test fixture alignment gauge) fit the 3/8-24 UNF holes at 0.496 inch centers in the alignment gauge at all set point elevations without interference, then the criterion would be demonstrated in practice.

Retesting was performed and the correct indexing was demonstrated by function. This design criterion has been

demonstrated by functional testing.

This criterion is redemonstrated in testing as per TPCN #10, which sought a rod alignment reverification under loaded Clamping Table conditions. Two W 17x17 assemblies or equivalent test weights were to be placed on the table and testing as per TPCN #8 was to be re-performed. This would functionally demonstrate that any tabletop load deflection would not impact gripper alignment with the fuel rods.

During the initial setup for this testing as per TPCN #10, it was discovered that the Clamping Table was approximately 0.25 inch too high for alignment of the holes in the test fixture with the rods in the pull head grippers. ERL #42 was prepared. This problem was initially attributed to a change in the homing point reference when the lower proximity sensor was adjusted in previous testing.

Subsequent discussion and investigation yielded additional contributing factors.

- It was observed that the test rod, when held in the gripper, was not held level. The rod sloped down toward the Clamping Table. Levelness in the gripper was not a design requirement. This observation required that the testing be performed with rods on the Clamping Table, not already in the grippers.
- It was discovered that the test fixture did not accurately represent the thickness of the fuel assembly grid. Thus, shimming of the test fixture in the upper clamp insert would be required to simulate a W 17x17 fuel assembly. Temporary shims would be used to shim the test fixture in the clamp insert.
- Once the Clamping Table's north position was aligned with the north pull head grippers, it was discovered that the south upper clamp assembly required shimming to place the W 17x17 assembly's first rod row at the same level as the south gripper centerline. Temporary shims would be used under the clamp insert to raise the clamp.

During this investigation, three more problems were identified.

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- During a homing sequence, it was observed that the Clamping Table elevation failed to properly complete the homing sequence. The motor was driving at a much reduced speed, but the position indication was changing at apparently normal speed. ERL #43 was prepared. Troubleshooting demonstrated that the problem disappeared when the power was removed from the automation controller. After power was restored, the homing operation was normal. There was no identified cause for this failure.

The homing sequence worked normally immediately following this troubleshooting. Subsequently, Clamping Table homing operations were monitored locally. The IST should also monitor the Clamping Table's homing operation during initialization if this problem recurs.

- During the next homing sequence, the lower proximity sensor faulted. The homing sequence was designed to lower the table until the lower proximity sensor was actuated. Then, the table would raise to clear the proximity sensor and stop at the first resolver null point after clearing the sensor. The sensor was cleared but it was immediately resensed, which resulted in a fault condition. It was assumed that this fault condition was the end-of-travel fault condition that would be appropriately alarmed outside of the homing sequence.

However, there were no alarms programmed for this circumstance and the TR-130 Control Station did not display the completed message sequence. It was easy to assume that the homing sequence was completed based solely upon the cessation of motion. Procedurally, it was important to verify that the TR-130 displayed the completed sequence. There was no interlock which prevented continued operation if the homing sequence failed in this manner.

The lower proximity sensor was replaced with a comparable sensor from another application. The electrical cabling was not identical to that of the original unit. However, the replacement unit worked and the cable can be reworked in Phase IV.

- During the observation of this problem, another

problem was identified. The desired operation of the motor brake was to release after the motor started and to engage before the motor stopped. In this manner, the only motion available would be the result of motor operations. The desired sequence was implemented during the motor start operation. However, it was not implemented for the motor stop function in a fault condition.

For the Clamping Table, the motor brake must be engaged to prevent drift down of the table. There is no mechanical drive restriction. In the proximity sensor fault, it was observed that the Clamping Table elevation decreased slightly after the fault.

Further investigation indicated that this could cause an operational problem following the reset of the fault condition. The automation controller did not retain the memory of this drift down following a fault. This particular controller, when it raised the table, could seek two differing types of set points. The table up set point was an absolute resolver number, and the controller would successfully find this set point after a motor fault.

However, the rod row set points required an incremental move of a fixed distance. In this situation, each subsequent rod row set point could be off precisely by the amount of drift following the fault. Consequently, the Clamping Table had to be lowered to the absolute row 1 elevation set point following a motor fault at row 2 or higher. This reestablished the "zero" for the incremental moves.

This problem is not expected to be encountered in the IST, which will not seek to demonstrate fault conditions. However, should this type of fault recur, the fault recovery should include the re-zeroing of the elevation as part of the exception's documentation.

After the required shims were installed and alignment was verified, the set point for the first rod row was changed to work with the revised test setup. Retesting was performed as per TPCN #24.

TPCN #24 demonstrated initially that the Clamping Table homed repeatedly at the same elevation and that there was no detectable drift down at the completion of the homing sequence.

Testing for the north Clamping Table position, after the resolution of two setup problems, demonstrated that the Clamping Table elevations aligned the test fixture with the north pull head grippers. ERL #45 addressed a problem related to level maintenance in the test fixture. After shimming and additional test fixture improvements, testing for the south Clamping Table position was also successful.

These test results were judged acceptable for the performance of the IST. Incremental elevation moves were adequate to ensure alignment on rod row centerlines.

4.1.2 Upper End Clamp Slide M-106A (Section 8.3.1.2)

Testing of the Clamping Table upper end clamp slide M-106A sought to demonstrate the following specific acceptance criteria. Three repetitions were used in initial testing to demonstrate repeatability.

- o Upper clamp slide M-106B saddle travels over its full range of $16.00 \pm .03$ inches.

TAC Change Notice 001 revised the TAC's criterion for the lower slide to add a ± 0.03 inch tolerance. It was intended that this change should also apply to the upper clamp slide. The criterion in the test procedure was 16.00 ± 0.03 inches.

Initial testing as per Section 8.3.1.2 in the HAND mode demonstrated a travel distance of 4.75 inches between the back and forward set points. ERL #10 was prepared for this discrepancy. TAC Change Notice 002 revised the criterion to match the test procedure's HAND mode set point coverage, that is, to 4.75 ± 0.25 inch. TPCN #15 documented the associated test procedure revision.

TPCN #10 was prepared to demonstrate the range of travel intent of the original criterion in the JOG mode. The TAC's original intent was to demonstrate the design range of travel. TPCN #10 was prepared using a 14 to 18.5 inch travel criterion since Factory Acceptance Testing (FAT)

had recorded an 18.5 inch measurement. The 14 inch lower limit was required for variations in grid locations across fuel assemblies.

Testing obtained 19.28 inches of available travel between torque faults. (The torque fault was used as the end-of-travel switch in the JOG mode.) ERL #24 was prepared to disposition the measurement discrepancy. The observed available range of travel in the JOG mode was acceptable.

- o Upper clamp slide saddle stops $1.00 \pm .03$ inches from the ends of the slide.

Initial testing as per Section 8.3.1.2 was performed, but the obtained data were not used to verify the criterion. This criterion was deleted by TAC Change Notice 002 as having no informational value. TPCN #15 subsequently documented the associated procedure revision.

However, this was a valid set point for both ends of travel. The HAND mode set points were to be established so that the slide did not drive closer than one inch from the hardstops (end of slide or end of rails). The drive screw was not to be operated beyond this range. The set points were to be established to provide a zero reference when the slide was in the back position. The forward position must be appropriate to the fuel type but also must not be closer than 1 inch from the forward hardstop. The bracketing tolerance was inappropriate.

Testing as per Section 8.3.1.2 demonstrated the real requirements even though the criterion was deleted. At 1.25 inches from the back hardstop, the drive screw was in-range. At 14.50 inches forward, the slide was positioned for the fuel but was not closer than 1 inch from the forward hardstop.

This distance criterion was redemonstrated for sign-off in testing as per TPCN #10 as " ≥ 1.00 inch" from the back hardstop since this motion was required for the load testing with B&W 15x15 fuel. TPCN #10 obtained a 1.125 inch dimension at the back position. The intent of the original criterion was demonstrated for the W 17x17 fuel type. Other fuel types may have differing forward set points.

4.13 Lower Clamps M-106C & M-106D (Section 8.3.1.3)

Testing of the Clamping Table lower clamps M-106 C and M-106D

sought to demonstrate the following specific acceptance criteria in three repetitions.

- o PWR lower clamps M-106C and M-106D close to $8.22 \pm .03$ inches and open to $10.42 \pm .03$ inches.

Testing as per Section 8.3.1.3 in the HAND mode with W 17x17 set points programmed obtained dimensions of 8.003, 8.008, and 7.991 inches (for M-106C) and 8.061, 8.077, and 8.061 inches (for M-106D) for clamp closure and respective clamp open dimensions of 10.073, 10.062, 10.062, 10.036, 10.033, and 10.051 inches. ERL #6 addressed the failure to obtain the required opening dimension. ERL #7 addressed the failure to obtain the required close dimension.

This criterion included no specific qualification for bowed fuel. TAC Change Notice 007 revised the criterion from a design criterion to a functional criterion and added the qualification for bowed fuel. The close criterion of 8.15 inches is required for the smallest fuel type's envelope (CE 14x14 is 8.25 inches plus compression for clamping force). The open criterion of 10.265 inches is required for the largest fuel type's envelope (B&W 15x15 at 8.536 inches), accounting for an RBT positioning error of 0.125 inch either way and for 1.5 inch bow in the fuel. Since the IST did not address operations with bowed fuel, there was no need to accommodate bowed fuel in the Phase III clamp set points.

However, at the time of preparation of TAC Change Notice 007, it was not understood that the clamp end-of-travel indication set point was fuel-type specific. It was assumed that no fuel specificity was required since the clamp operated to torque a set point in closing and opening. However, a different close set point, based on position, was required for each fuel type so that, when the fuel was clamped at a torque set point, the "CLOSE" indication was illuminated and the motor torque shutdown at clamping force did not produce the torque fault alarm.

Testing as per Section 8.3.1.3 demonstrated that the revised closed criterion was satisfied, providing a range of travel in the closed direction adequate for W 17x17 (< 8.43 inches of closure was required).

Testing did not demonstrate the functional clamp opening criterion of 10.265 inches for B&W 15x15 fuel. However, it did demonstrate the criterion in respect to unbowed

fuel ($10.265 - 1.5 = 8.765$ inches). For W 17x17, the dimension must be (8.43 inches for envelope + 0.25 inch for RBT positioning error either way + 1.5 inches for bow =) 10.18 inches. The fuel-specific criterion for unbowed fuel was demonstrated.

Additional testing in the JOG mode as per TPCN #10 produced clamp data as follows:

	<u>OPEN</u>	<u>CLOSED</u>
M-106C:	10.256	6.941
M-106D:	10.323	6.694

This testing shows that, operating in the JOG mode, a range of travel appropriate to worst case conditions for all fuel types was available for M-106D. (<7.76 inches for W 14x14 to >10.265 inches for B&W 15x15). M-106C was short by 0.009 inch in the opening dimension. This remains an open exception to be resolved in Phase IV for worst case conditions. It may be that further calculations, accounting for uniform bow and the length of the Fuel Assembly Handling Fixture, will show that the obtained clamp opening was adequate for bowed fuel.

This result was adequate to enable the performance of the IST for normal operations.

- o PWR lower clamps M-106C and M-106D provide a closure force of 1900 to 2000 lbs.

TAC Change Notice 001 revised the TAC's criterion to 1900-2000 lbs for measurement bracketing, a DOE requirement. This criterion was revised by TAC Change Notice 005 to 1000 ± 100 lbs as adequate to meet pulling force requirements.

Testing as per Section 8.3.1.3 closed the clamp in the HAND mode on a compression load test fixture. This testing obtained force readings of 830 to 1070 lbs for M-106C and 740 to 800 lbs for M-106D. ERL #8 was prepared, suggesting that the criterion be lowered to meet the obtained values.

This exception was closed, based upon the subsequent test results that the obtained total clamping force was adequate to meet rod extraction pulling force requirements. Testing as per Section 8.1.6 demonstrated

that, with the upper clamps, there was sufficient closure force to hold the assembly in place during extraction operations. This later functional test result was sufficient to enable the IST for normal operations.

TAC Change Notice 007 sought to change the criterion again to read; "... measured closure force of between 700 and 1200 lbs". The deficient readings were erroneously attributed to an instrumentation problem as described in the test log. This presumed problem caused significant variations in the readings due to sampling time limitations. Subsequently, the cause of this problem was identified as a mechanical design problem because the bearing surface friction reduced the available closure force. Friction increased significantly as clamp load increased, limiting the effective clamping force.

This design criterion was not demonstrated in Phase III SOT testing even though the functional criterion was demonstrated. A redesign is required in Phase IV.

4.1.4 Lower Clamp Slide M-106B (Section 8.3.1.4)

Testing of the Clamping Table lower clamp slide M-106B sought to demonstrate the following specific acceptance criteria in three repetitions.

- o Lower clamp slide M-106B saddle travels over its full range of 16.00 ± 0.03 inches.

This criterion was originally intended as a minimum travel range requirement. TAC Change Notice 001 added a tolerance of ± 0.03 inch for measurement bracketing. The procedure incorporated the bracketing.

Initial testing as per Section 8.3.1.4 was started but not completed. Operating in the HAND mode, the clamp was positioned at each end of travel. The initial testing obtained a total recorded travel of 21.406 inches.

TAC Change Notice 007 revised the criterion to $14.0 - 0.03/+2.0$ inches. This was in line with the design intent. The slide was to have an available functional range of travel of 14 inches, one inch from either end in the 16 inches of mechanically limited travel. The screw's warranty only applied in this 14 inch range with this limit used for programmed operations.

Subsequent testing as per TPCN #10 was performed in the JOG mode to measure the available range of travel. TPCN #10 provided a 15.625 inch range between the ends of travel. In this case, the ends of travel were motor torque faults at the hardstop or at the end of the drive thread. The 21.406 inch data recorded in initial testing remained unexplained.

The revised functional criterion was demonstrated. The slide can move at least 14 inches.

- o Lower clamp slide M-106B saddle stops $1.00 \pm .03$ inches from the end of the slide.

This criterion for the upper clamp slide was deleted by TAC Change Notice 002 as having no informational value. The lower clamp slide procedure section was also marked up for deletion of the requirements as per TCN 002. ERL #10 was used as the basis of the procedure revision. This TAC deletion was inferred to apply to the lower clamp slide even though this was not specifically implemented by the change notice or in ERL #10.

The original intent of the criterion was to ensure that slide travel was inhibited by one inch at each end of available travel due to gear limitations at the end of travel. The idea was that the software was to prevent travel closer than one inch from the end of the slide. The criteria should have been "stops at ≥ 1.00 inch". However, bracketing was added to the TAC.

Initial testing as per Section 8.3.1.4 obtained data while operating in the HAND mode that the slide stopped at 0.937 inch from the back end of travel but did not record the distance from the forward end of travel. TPCN #10 was prepared to test the available range of travel in the JOG mode.

TPCN #10 was prepared under the assumption that internal cam switches would serve to stop the clamp slide motor from reaching the end of travel. Testing as per TPCN #10 observed that the clamp slide did travel closer than one inch from the end of the rails (east & west ends) and contact the hard stop (west end only). ERL #21 was prepared to identify that no internal end-of-travel switches were provided. The actual end-of-travel limit was the overtorque fault.

This did not affect the IST which does not require that

the lower clamp slide be operated in the JOG mode. HAND mode set points were adequate for this criterion since these set points were also applicable to the AUTO mode of operations.

TPCN #10 also checked lower clamp slide operations in the HAND mode. Initial testing as per TPCN #10 showed that the lower clamp slide stopped at 15/16 inch from hardstop. This was consistent with the originally recorded data but less than the required 1 inch limit. ERL #33 addressed this discrepancy. The software's position set point was revised and the 1 inch criterion was demonstrated in retesting. ERL #43 accepted that these measurements were made with a tape measure.

4.1.5 Upper End Clamps M-106E2 and M-106G2 (Section 8.3.1.5)

Testing of the Clamping Table upper clamps M-106E2 and M-106G2 sought to demonstrate the following specific acceptance criteria in three repetitions.

- o PWR upper clamps M-106E2 and M-106G2 close to $7.22 + .03$, $- .06$ inches.

Initial testing as per Section 8.3.1.5 closed the upper clamps in the HAND mode with W 17x17 fuel set points selected and obtained closed measurements of:

- 8.019, 8.007, and 8.031 inches for M-106E2 and
- 7.996, 7.985, and 7.891 inches for M-106G2.

This did not meet the acceptance criterion, and ERL #12 was prepared. The exception was completed based upon the preparation of TAC Change Notice 007, which revised the criterion to read "< 8.15 inches" as would be required for processing CE 14x14 fuel assemblies. This design criterion was revised as a functional criterion.

However, this change was made based upon the assumption that these were the only assemblies considered in Phase III. The smallest envelope dimension for PWR assemblies is 7.76 inches for W 14x14 as per the design data sheets. TAC Change Notice 007 did not account for fuel-specific set points which were required by the software's configuration.

Testing as per TPCN #10 in the JOG mode obtained closed measurements of 6.256 inches for M-106E2 and 6.818 inches

for M-106G2 at the clamp's overtorque end-of-travel. This demonstrated that the original criterion's 7.22 inch range of travel is available in the JOG mode. Thus, the smallest PWR fuel type can be accommodated.

Testing also resulted in the recognition of the fuel-specific set points for the "CLOSE" indication.

However, testing of M-106G2 resulted in a problem which required reverification of all upper clamp set points. This upper clamp was driven off its gear and the resolver was driven off its range. After corrections, retesting for end-of-travel indications resulted in HAND mode "CLOSE" indication dimensions at 8.137 (M-106E2) and 8.101 (M-106G2) inches. Closure force was verified to be adequate at these position indication set points for W 17x17. Set point retesting for the other fuel types was not performed.

The revised functional range-of-travel criteria was demonstrated specifically for W 17x17 fuel. The upper clamps could close on all design basis fuel assemblies. HAND mode set point problems were also resolved.

- o PWR upper clamps M-106E2 and M-106G2 provide a clamp hold-down force of 190 ± 10 lbs.

Initial testing as per Section 8.3.1.5 closed the upper clamp swing bar on a compression load test fixture and obtained test results of:

- 160, 170, & 185 lbs for M-106E2 and
- 190, 180, & 200 lbs for M-106G2.

These values did not all meet the criterion's limits and ERL #13 was prepared. The exception was dispositioned that subsequent testing as per TPCN #9 demonstrated the operational function of the clamps. TAC Change Notice 007 revised the acceptance criterion to 160 to 200 lbs., based upon the disposition of the exception. TPCN #14 documented the revised criterion in the test procedure.

The upper clamp force was retested as per TPCN #10. Clamp forces of 175 and 180 lbs. were demonstrated in the verification runs. The revised criteria have been redemonstrated.

However, the 2,000 lb. compression force gauge used in

both test sections had a calibrated accuracy of 1% or $\pm$ 20 lbs. Testing was performed with deformable blocks of wood as shims, and some of the variation in data logged in the test log was attributed to the slight changes in "fuel assembly" width. However, the data were in the area required. The design criterion was adequately demonstrated to support the IST for normal operations.

- o Testing of the upper clamps also sought to demonstrate that the clamp swing point dimension was greater than the width of the largest fuel assembly. This dimension was set for B&W 15x15, which has an envelope of 8.536 inches.

The upper clamp's swing bar was initially oriented along the east/west axis to provide clearance for fuel loading. When closing, the swing bar rotated to the north/south axis and lowered to clamp the fuel at a grid. This clamping served to position the fuel in the vertical axis for alignment with the pull head grippers. East/west positioning was established when the RBT placed the fuel on the Clamping Table. North/south positioning was ensured by the use of clamp inserts sized for the fuel type.

When extraction was completed, the upper clamp bar raised until it cleared a mechanical stop; then it would swing to the west, thus allowing the fuel assembly clearance for removal. The elevation of the mechanical stop should be set higher than the thickness of the fuel so that the swing bar swings freely.

Testing demonstrated that upper clamp 1 swings freely at 8.875 inches while upper clamp 2 swings freely at 8.823 inches.

4.2 LOAD CELL VERIFICATION (SECTION 8.3.2)

Section 8.3.2 of the test procedure was not performed in initial testing. This procedure was designed to demonstrate load cell response for addition and removal of test weights. The verification of load cell response was also addressed in Section 8.1.3 using mock-up fuel assemblies. TPCN #10 deleted this section in the original procedure's text and performed the testing which was not demonstrated in initial testing as per Section 8.1.3. See Test Report, Section 4.3 for the test results.

4.3 LOADING VERIFICATION FOR ONE FUEL ASSEMBLY (SECTION 8.1.3)

Testing sought to demonstrate the following specific acceptance

criteria for each Clamping Table position as a single B&W 15x15 mock-up fuel assembly was placed in each Clamping Table position by the RBT.

Testing was performed, and a B&W mock-up fuel assembly was placed in each Clamping Table position. TPCN #7 documented the change in the loading sequence implemented in initial testing. Position 2 was loaded first, followed by position 1. Position 2, the north position reflected the desired loading sequence. With this loading sequence, a fuel assembly was not transferred over another fuel assembly. The test procedure's position designations did not accurately reflect the programmed designations.

- o When a fuel assembly is placed into clamp position, load cell indication is present at control station for the correct position.

In initial testing as per Section 8.1.3, the load cells failed to report the presence of fuel. This was documented by ERL #15. The load cell problem was not resolved in initial testing.

TPCN #10 was prepared to complete testing for this SOT and incorporated this section's criteria in principle. TPCN #23 was issued revising TPCN #10 methodology related to use of the RBT. The test procedure's criteria are described as follows:

- When a fuel assembly is placed in clamp position 1, the Control System indicates its presence for clamp position 1 and does not indicate its presence in clamp position 2.
- When the fuel assembly is removed, the Control System no longer indicates the presence of fuel.
- When a fuel assembly is placed in clamp position 2, the Control System indicates its presence for clamp position 2 and does not indicate its presence in clamp position 1.
- When the fuel assembly is removed, the Control System no longer indicates the presence of fuel.

Testing as per TPCN #23 was performed to demonstrate the required load cell acceptance criteria during load testing of the Clamping Table with W 17x17 fuel assemblies during retesting of Sections 8.1.3 and 8.1.4. Testing as per TPCN #23

discovered that the load cell inputs were not displayed on the control screen. ERL #41 was prepared.

ERL #41 identified that the Control System's load cell set point had been revised in previous testing as per ERL #6. However, the mechanical adjustment required to position the load cell's actuator had not been performed. Mechanical adjustment was performed and load cell operation was successfully demonstrated in retesting. When a W 17x17 mock-up fuel assembly load was placed on each Clamping Table position, the Control System registered its presence. When the load was removed, the load cell's indication was cleared. Response was appropriate for position.

- The centerline of the lower clamps aligns with the lower end fitting of the mock-up fuel assembly and the centerline of the upper clamps aligns with the upper grid of the fuel assembly.

A mock-up fuel assembly was to be deposited on the Clamping Table at the RBT's positioning set point. Then, alignment of the clamps was to be visually verified. However, the RBT's SOT had not yet been completed. TAC Change Notice 006 was drafted to delete this acceptance criterion from this SOT. This criterion was to be demonstrated during RBT testing. TCN 006 was not issued and was subsequently voided. However, TPCN #7 was prepared to delete the criterion from the test procedure based upon the TAC Change Notice. TPCN #7 was subsequently superseded by TPCN #10.

The documentation of initial testing did not address a physical problem which was subsequently demonstrated in TPCN #10 testing as per TPCN #23. TPCN #23 was issued to delete the use of the RBT in fuel positioning since the RBT's testing still had not been completed.

The fuel assembly, without the upper end fitting removed, cannot be placed on the Clamping Table to check clamp alignment. TPCN #23 sought to demonstrate these criteria by measurements. ERL #40 documented that these criteria were demonstrated indirectly by measurements.

Assuming that the RBT correctly positioned the fuel assembly for the gripper interface, measurements show that the upper clamps will align with the second grid and that the lower clamp will align with the lower end fitting on W 17x17 fuel assemblies.

Note that the design of the PWR upper clamp assembly did not provide for clamping at the upper grid of the fuel assembly. Rather, clamping was performed at the fuel assembly's second grid. No TAC Change Notice was issued for this discrepancy since testing could not be performed with the mock-up fuel assemblies without removal of the upper end fitting.

This demonstration was adequate to support the IST. Upper clamping support at the second grid was required for W 17x17 assemblies because the first grid was too near the end of the fuel. Support at the first grid, after cutting, was appropriate for B&W 15x15 assemblies.

This demonstration is adequate to support the IST.

- Fuel assembly mock-up is able to be installed via the RBT with PWR FAHF.

This criterion could not be demonstrated cleanly in the SOT because the fuel assembly end fittings had not yet been removed. The presence of the end fittings caused an interference with the Extraction Table. Testing demonstrated that, with the RBT in the JOG mode, fuel assemblies could be placed on the Clamping Table when the lower clamp slide and the center supports were repositioned for upper end fitting clearance. This criterion was adequately demonstrated to support the IST.

- After the fuel assembly is loaded and the table is lowered to the row 1 position, raised to the row 8 position, and raised to the row 17 position, the table corner elevations remain within ± 0.09 inch from the unloaded elevations.

Initial testing as per Section 8.1.3 was performed to demonstrate this design criterion. In initial table elevation testing for unloaded and loaded conditions, there were significant measurement

discrepancies across locations, days, and test conductors. The data were not consistent. Most data sets tended to show that the horizontal criterion was demonstrated. However, some sets of data indicated a greater value than acceptable. This bad data may be attributable to a slip in the "reference plane" since the discrepancy was somewhat comparable across bad data sets. However, the bad data could also reflect a repeatability problem.

TPCN #10 was prepared to reperform this testing in one run with one test conductor with a single established reference point for each corner, the floor directly beneath the corner. Elevation offsets would be normalized. Repeated measurements could be made to verify repeatability in the control system and to average the measurement errors made in using a tape measure.

Testing was performed using measurement locations on the floor established by using a plumb bob. Marks were made on the floor and the table for standardization of the measurement locations. A folding carpenter's rule attached to a metal bar was used to ensure a straight "tape measure". A mirror was used to eliminate errors in reading from varying angles. With the mirror, the view to the rule was always in line with the horizontal edge of the tabletop.

Testing was not performed in one run as was the original intent. However, runs were performed from a known configuration after homing, thus eliminating potential error due to uncontrolled changes in table elevation.

The data obtained indicated a slightly greater deviation than obtained for the previous unloaded run data. This was attributed to a slight modification in the measurement method. The folding metal rule was replaced with a continuous tape measure to eliminate difficulties in making measurements at the hinged sections of the carpenter's rule.

Testing demonstrated that the Clamping Table's elevation drive was repeatable within the limits of measurement error. Thus, the errors in initial testing could be attributed to measurement error (a slip in the reference plane).

Testing demonstrated that the Clamping Table remained

within ± 0.09 inch level within the limits of measurement error under variations in load and elevation. ERL #36 was prepared to clarify the definition of "true horizontal plane" for testing purposes.

Later testing addressed the functional criterion of rod alignment with the pull heads which required an elevation error of ≤ 0.01 inch.

4.4 LOADING VERIFICATION FOR TWO FUEL ASSEMBLIES (SECTION 8.1.4)

Testing sought to demonstrate the following additional specific acceptance criteria when the table was loaded with two B&W 15x15 mock-up fuel assemblies.

- o After two fuel assemblies are loaded to the Clamping Table and the table is lowered to the row 1 position, raised to the row 8 position, and raised to the row 17 position, the table corner elevations remain within ± 0.09 inch from the unloaded elevations.

Initial testing was performed to demonstrate this design criterion. The inconsistent test results are described in Section 4.3 of this report.

Testing demonstrated that the Clamping Table remained within ± 0.09 inch level within the limits of measurement error under variations in load and elevation. ERL #36 was prepared to clarify the definition of "true horizontal plane" for testing purposes.

Later testing addressed the functional criterion of rod alignment with the pull heads which required an elevation error of ≤ 0.01 inch.

- o After two fuel assemblies are loaded to the Clamping Table and the table is raised to the row 8 position, and raised to the row 17 position, the table load deflection is less than 0.06 inch from the unloaded condition.

Initial testing as per Section 8.1.4 sought to demonstrate the deflection criterion. These "loaded" data were to be compared to the "unloaded" data in Section 8.3.1.1. However, comparisons indicated that the table tended to raise when loaded. This unexpected result was attributed to nonsequential testing by different test conductors over different days and other difficulties.

TPCN #10 was prepared to demonstrate this criterion in one run with one test conductor with standardized measurements. Additionally, TPCN #10 addressed the potential of tilt with only one fuel assembly present. B&W 15x15 assemblies were used as the heaviest assemblies in the test program.

TPCN #10 demonstrated that, after normalization and averaging of the data, a load deflection of -0.021 inch was present for two B&W 15x15 fuel assemblies. These data were comparable to the load deflection for the north position only of -0.027 inch and for the south position only of -0.013 inch. The data indicated a slight load deflection, but the numbers indicated enough variation across load conditions that the amount of deflection was not certain.

Since the gripper interface was tested under loaded conditions with W 17x17 assemblies (Ref. Section 4.5 of this report), any effects of load deflection will be minimized for the IST. This criterion was adequately demonstrated to support the IST.

4.5 ROD EXTRACTION SYSTEM INTERFACE (SECTION 8.3.3)

Testing as per this section sought to demonstrate that the differences between Clamping Table rod row elevations and the respective pull head centerlines remained within ± 0.01 inch for all rod row set point elevations.

Testing was to demonstrate by measurements from a reference point that the distance to the centerline of the grippers and the distance to the centerline of each rod row at the rod row set point did not vary by ± 0.01 inch. However, testing was not performed. Testing as per TPCN #8 was used to demonstrate this criterion.

TPCN #8 testing used an alignment gauge and dummy test rods. Dummy test rods were placed in the grippers and verified to align with the holes in the alignment gauge when the Clamping Table was indexed to each rod row position. At each elevation, the pull head was extended to insert the test rods into the alignment gauge. The test rods were 0.010 inch smaller than the holes in the alignment gauge. If the test rods entered the associated holes in the gauge at each elevation without interference, then this criterion was functionally demonstrated. Testing successfully demonstrated this criterion for unloaded conditions.

TPCN #10 subsequently sought to demonstrate this criterion for loaded conditions. Two GFE W 17x17 mock-up fuel assemblies were

placed on the Clamping Table, and testing similar to that performed in TPCN #8 was to be repeated. However, some difficulties were encountered. Test rod alignment with the alignment gauge was not initially observed. The Clamping Table's elevation was about 0.25 inch high. ERL #42 addressed this issue.

Investigation indicated that the test rods held in the grippers were not level. This observation was evaluated. Levelness of test rods in the gripper was not a design criterion. A slight lack of angular alignment in the vertical direction was acceptable in extraction operations. Over the nominal 0.5 inch gripping surface, the error due to angular alignment was negligible. The angular alignment in this test was sufficient, over the length of the test rod, to provide an unacceptable elevation offset. Rather than change the table elevation set points to pass the test, it was decided to revise the test methodology to more closely represent actual extraction operations.

The test was revised as per TPCN #24 to simulate actual rod gripping. The test rods were to be mounted in the alignment gauge and then gripped. Test rods of the required length were fabricated. A wooden plate with drilled holes previously used in extraction demonstrations would be used to represent the first fuel assembly grid.

If rods at each rod row elevation set point could be gripped without interference with the next row down, then gripper alignment across set points was functionally demonstrated. The test fixture was to be installed with a test rod at each elevation in the alignment gauge. Then the pull head grippers were extended to grip the test rod. If the first rod was successfully gripped, then it was released and the pull head retracted. After this first rod was removed, the table indexed to the next position, and the process was repeated until each rod was successfully gripped.

Investigation of this alignment problem also raised a question about the accuracy of the homing for the Clamping Table. This was pursued with the result that the table elevation, when homed, was about 0.63 inch higher than previously recorded. This apparent difference did not exceed the range of measurement error and may not be a valid observation. However, it was decided that TPCN #24 testing should include verification of homing repeatability, and this was subsequently demonstrated.

Also investigated was the comparability of the alignment gauge with the mock-up fuel assembly. It was determined that some slight shimming of the alignment gauge would be required to more closely represent the mock-up fuel assembly. This was incorporated in TPCN #24 testing with 0.020 inch shims being placed under the fixture.

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Another item was investigated. The processing of W 17x17 fuel assemblies used an insert placed in the upper clamp brackets for fuel assembly centering. The height of this insert was 0.248 inch. If previous alignment testing was not performed with this insert in place, then the required elevation correction would be equivalent to the observed elevation error. Previous testing was reported to be performed with the insert in place.

Finally, the Clamping Table and other items of equipment have experienced repeated problems with the homing proximity sensor. This proximity sensor could have been replaced before testing as per TPCN #24 was initiated. If the sensor had been replaced, the new sensor could produce a different sensitivity. This could account for the observed difference in elevations.

TPCN #24 testing required a row 1 elevation set point revision to eliminate the observed elevation error. After this, the incremental set points would be verified at each subsequent row. After initial set point tuning and after some test setup problems were resolved, testing proceeded to demonstrate that the Clamping Table's north position elevation set points were good.

Testing on the south Clamping Table position indicated that there was a slight elevation error between this position and the south grippers. It was not known whether this was a difference in the gripper's position or a difference in the table's position. Both indicated level with a carpenter's level. The south Clamping Table position was shimmed, by trial and error, until interface alignment could also be demonstrated for this position. Shimming of 0.020 inch was required.

This TPCN #24 testing was adequate to demonstrate that the rod row incremental elevation set points were accurate once the row 1 set point was established. The row 1 set point was established using the test fixture. The IST would verify the accuracy of the row 1 setpoint. Permanent incorporation of the required shimming could be accomplished in a later design phase. These test results were adequate to support the IST.

4.6 CLAMPING TABLE INTERFACE LOAD VERIFICATION (SECTION 8.1.6)

Testing sought to demonstrate the following specific acceptance criteria related to extraction force loading of the Clamping Table.

- o When a 3400 ± 50 extraction force is applied to the Clamping Table, the Clamping Table does not deflect toward the force by over 0.09 inch.

TAC Change Notice 007 supersedes TAC Change Notice 001's

requirements for a 6800 lb. test force since the design basis was 2600 lbs., not 6800 lbs. The clamp load calculation assumed that the fuel assembly will have two "stuck" rods, each of which require 200 lbs. of force to extract. The remaining 15 rods were assumed to require only 40 lbs. of extraction force each. With a 1.5 safety factor, only 1300 lbs. per fuel assembly will be required for extraction operations.

TPCN #9 was issued to revise the test procedure to

- be in accordance with the TAC's requirement that the Clamping Table be in the full up position,
- use the TAC's listed 2600 lb. test force and not the procedure's 3400 lbs.,
- use one pull head assembly rather than two for test load application, and
- take measurement at each side of the Clamping Table's east end to obtain a measurement of twist under single fuel-assembly configuration.

The Upper Clamp Assembly was removed from the Clamping Table and a load test fixture was installed. The load test fixture was connected by cable to a pull head drive. Initial distance measurements were obtained for the separation between the Clamping and Extraction Tables. The pull head drive was then retracted to apply the test force. The force was held for a short while and the deflection was measured.

A nominal 2800 lb. horizontal force was applied with one pull head assembly to obtain measurements of deflection and twist. For the north side of the Clamping Table, the deflection was 0.045 inch. For the south side, it was 0.036 inch. This met the acceptance criterion of ≤ 0.09 inch deflection. The observed 0.009 inch twist was acceptable, using only one pull head.

However, the 2800 lb. test force, as noted in the test log, exceeded the acceptance criterion's 2600 ± 50 lbs. The criterion's tolerance was too tight for field conditions. The 2800 lb. test force was deemed acceptable. TAC Change Notice 007 and TPCN #12 expanded the tolerance to $+250/-50$ lbs.

Finally, the recorded data for this test indicate that

there was a static alignment difference of (2.920" south -2.365" north =) 0.555 inch between the Clamping Table and the Consolidation Table. This misalignment was evaluated as acceptable since subsequent gripper interface testing has been successfully performed.

These test results were adequate to support the performance of the IST.

- o When a 3400 to 3500 lb. extraction force is applied to a clamped load cell in the lower clamps, the load cell test fixture is not pulled free of the clamp.

TAC Change Notice 001 revised the original 3400 lb. test force criteria to "3400 to 3500" lbs. to provide a testable range.

TAC Change Notice 005 revised the criterion's value to "1300 $\pm$ 100 lbs" to be consistent with the clamp load calculation. The clamp load calculation assumed that the fuel assembly will have two "stuck" rods, each of which require 200 lbs. of force to extract. The remaining 15 rods were assumed to require only 40 lbs. of extraction force each. With a 1.5 safety factor, only 1300 lbs. per fuel assembly would be required for extraction operations.

TAC Change Notice 007 subsequently deleted the test entry's reference drawing since a different but acceptable test fixture was used in testing.

TPCN #9 implemented these TAC corrections in the test procedure. TPCN #9 also directed the use of the tube steel mock-up fuel assembly, to be gripped in both the upper and lower clamps, to more closely represent actual operating conditions.

A tube steel mock-up fuel assembly was clamped in each lower clamp position sequentially. The mock-up was attached by cable to each pull head drive and the pull head drive was retracted to apply a nominal 1300 lb. extraction force. The mock-up was then observed. In position 1, a 1300 lb. force was applied. In position 2, 1400 lb. and 1325 lb. forces were applied. This testing demonstrated that the test fixture was not pulled free of the clamps.

Additional informal testing demonstrated that a nominal 2000 lb. force was required to cause test fixture

slippage in the clamps. This did not violate the acceptance criterion's range which was set for test facilitation and not for safety reasons.

This revised acceptance criterion has been demonstrated, and the test results are judged to be acceptable to support the IST.

4.7 INTERLOCK VERIFICATION (SECTION 8.3.4)

This test sequence consisted of setting up various interface conditions for the different drive systems of the Clamping Table. Once these conditions were set up, an attempt was made to operate the effected drive system through its range of motion. The purpose of this test was to verify that the drive systems would operate only when a predefined set of conditions was satisfied. This test consisted of either applying or not applying various interface conditions through temporary changes in the Control System data registers. Once these interface conditions were established, an attempt was made to operate the appropriate drive system in the HAND mode. This test series continued until every practical combination of these interlocks was tested to verify that each drive system would operate only under the proper conditions.

Multiple minor procedure corrections were formalized by TPCN #11 to correct and clarify drive nomenclature in Section 8.3.4.

During this test, seven different drive system operations were tested as follows:

- o Lower clamp slide M-106B was successfully tested to demonstrate that it can only operate in either direction with no fuel present in either clamp position.
- o Upper clamp slide M-106A was successfully tested to demonstrate that it can only operate in either direction with no fuel present in either clamp position. This is appropriate for Westinghouse fuel types.
- o Lower clamp 1 M-106C was tested to demonstrate that it can only open with no fuel present and after the extraction operation is completed.

ERL #11 was issued to identify that the acceptance criterion incorrectly stated that both "no fuel present" AND "extraction complete" must be true to open this clamp. The actual requirement is that either "no fuel present" OR "extraction complete" must be true. Thus, if fuel is present, extraction must be complete. TAC Change

Notice 003 corrected the TAC and TPCN #3 corrected the procedure for this error.

Lower clamp 1 (M-106C) was successfully tested to demonstrate that it can only open with no fuel present or after the extraction operation is completed.

- o Lower clamp 2 (M-106D) was tested to demonstrate that it can only open with no fuel present and after the extraction operation is completed.

ERL #11 was issued to identify that the acceptance criterion incorrectly stated that both "no fuel present" AND "extraction complete" must be true to open this clamp. The actual requirement is that either "no fuel present" OR "extraction complete" must be true. Thus, if fuel is present, extraction must be complete. TAC Change Notice 003 corrected the TAC and TPCN #3 corrected the procedure for this error.

Lower clamp 2 (M-106D) was successfully tested to demonstrate that it can only open with no fuel present or after the extraction operation is completed.

- o Upper clamp 1 (M-106E2) was tested to demonstrate that it can only open with no fuel present and after the extraction operation is completed.

ERL #11 was issued to identify that the acceptance criterion incorrectly stated that both "no fuel present" AND "extraction complete" must be true to open this clamp. The actual requirement is that either "no fuel present" OR "extraction complete" must be true. Thus, if fuel is present, extraction must be complete. TAC Change Notice 003 corrected the TAC and TPCN #3 corrected the procedure for this error.

Upper clamp 1 (M-106E2) was successfully tested to demonstrate that it can only open with no fuel present or after the extraction operation is completed.

- o Upper clamp 2 (M-106G2) was tested to demonstrate that it can only open with no fuel present and after the extraction operation is completed.

ERL #11 was issued to identify that the acceptance criterion incorrectly stated that both "no fuel present" AND "extraction complete" must be true to open this clamp. The actual requirement is that either "no fuel

present" OR "extraction complete" must be true. Thus, if fuel is present, extraction must be complete. TAC Change Notice 003 corrects the TAC and TPCN #3 corrects the procedure for this error.

Upper clamp 2 (M-106G2) was successfully tested to demonstrate that it can only open with no fuel present or after the extraction operation is completed.

- o Clamping Table elevation drive M-106I was successfully tested to demonstrate that it can only raise or lower when both the rod extraction pull heads are retracted back.

Based on the results of the testing performed on the software interlocks, the Clamping Table was judged to be acceptable for continuing on to the next series of tests.

4.8 SINGLE MODE AND AUTO MODE VERIFICATION (SECTION 8.3.5)

This test sequence consisted of operating the Clamping Table in both the SINGLE mode and AUTO mode of operations. The purpose of these tests was to verify that the operating sequence for each system was correct. Each test executed all required process steps.

- o Upper and lower clamp slides move into position to receive fuel.

This step was performed during the system initialization process. Once in the correct position, the slides made no further moves. This was the initial condition at the start of the test sequence.

- o Upper and lower clamps move to the open position.

This step was performed during the system initialization process and at the completion of every extraction cycle. This was the initial condition at the start of the test sequence.

- o Clamping Table is raised to the up elevation.

This step was performed during the system initialization process and at the completion of every extraction cycle. This was the initial condition at the start of the test sequence.

- o Signal received that fuel is in position and RBT is clear.

This test procedure acceptance criterion reflected the intent that the automatic sequence be initiated. The programmed extraction sequence neither required that fuel be present or that the RBT be clear to start the sequence. However, in the automatic transfer of fuel to the Clamping Table, both conditions must be true or an alarm condition will be presented.

- o After simulated fuel placement, the upper and lower clamps close.

This step was initiated by the Cutting System with the transfer of processed fuel to the Clamping Table. It may also be initiated by actuation of "GO" in the AUTO mode. This is the first step in the extraction sequence.

- o After clamp closure, the table lowers to the first rod row position.
- o After each simulated extraction operation for rows 1 through 16, the table indexes to the next row up.
- o After all extraction operations are completed, the table raises to the up position.
- o Then the upper and lower clamps open.
- o Then a signal is generated to the RBT to remove the skeletons.

Based on the results of these tests, the Clamping Table was judged acceptable for the IST.

4.9 SERVO-DRIVE FAULT TEST (SECTION 8.3.6)

This test sequence consisted of implementing a servo-drive fault during the operation of Clamping Table elevation drive M-106I. The purpose of this test was to verify that the equipment properly responded to the fault condition and that the proper signals and error messages were displayed at the Control System. The test was executed by operating the system in the SINGLE mode and simulating a fault condition by temporarily changing the Control System data register.

The test procedure was prepared to simulate a torque fault condition. The TAC did not specify a particular fault condition. TPCN #4 was prepared to demonstrate an end-of-travel fault due to difficulties encountered in attempting to initiate a torque fault during the indexing interval.

During the testing, acceptance criteria were met as follows:

- o Motor stops when fault condition is implemented.
- o Alarm system is activated.
- o Alarm is silenced when acknowledged by the operator.
- o Control System displays fault condition on control screen.
- o A report is generated defining fault condition when commanded by the operator.

The alarm report was automatically generated. TAC Change Notice 007 corrected the TAC for this discrepancy. No TPCN was generated after the fact to correct the test procedure. The revised wording was used in retesting as per TPCN #10 for camera 7 retesting.

- o When "CALL CAMERA" was actuated, video images from cameras 3 and 7 are displayed on monitors.

Initial testing observed that CCTV camera 3 was displayed but CCTV camera 7 was not. ERL #1 applied. CCTV camera 7 had not been installed at the time of testing. TPCN #16 formally corrected the original test procedure to delete camera 7 as per the markup.

TPCN #10 testing subsequently demonstrated the original criterion for both cameras.

Testing as per TPCN #10 determined that the "CALL CAMERA" feature must be actuated before the "ALARM ACK" feature to ensure that the correct cameras were displayed (Ref. ERL #47). When the "CALL CAMERA" was actuated before the alarm was acknowledged, cameras 3 and 7 were displayed.

- o Both cameras can be positioned to provide an unobstructed view of the faulted drive system.

This criterion was met in initial testing for CCTV camera 3 only. Camera 7 was not installed at this time. No CCTV Assessment Form was completed in initial testing for camera 7.

Retesting as per TPCN #10 demonstrated that CCTV camera 3 provided a partially obstructed view of the faulted drive subassembly and components, that is, not all of the

elevation drive motor M-106I could be observed. There was no effective coverage for the mechanical portion of the drive system. Additionally, depending upon the location of the MT, this may obstruct coverage. However, it was the best available camera selection for an elevation drive motor fault.

Retesting as per TPCN #10 also demonstrated that CCTV camera 7 provided an unobstructed view of the Clamping Table top. This coverage is adequate for any faults associated with clamps and slides. It does not provide good coverage for faults related to the table elevation drive M-106I.

- o The system can be recovered from a fault condition and SINGLE mode operations continued.

Based on the above test results, the Clamping Table was judged to be acceptable for the IST.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

In general, the Clamping Table performed as designed with minor exceptions. It performed its design function to receive, position, and restrain the fuel assemblies during the rod extraction process. The following conclusions are drawn from this SOT.

- o With some minor deficiencies, all drive systems operated as designed under both loaded and unloaded conditions. Drive operation was adequate for IST.
- o All systems operated as designed for all modes (JOG, HAND, SINGLE, and AUTO) of operations. However, a HAND mode program deficiency is identified. The Clamping Table should be provided with the capability to raise to the up position.
- o The Clamping Table operated as designed under fault conditions. However, some CCTV coverage inadequacies were observed.
- o The proper interfaces with the RBT and with the Extraction Systems were achieved as could be demonstrated in this test procedure. The RBT can physically place a fuel assembly on the table in each position but HAND mode operations could not be demonstrated with the specific fuel assemblies

because the upper end fitting created an interference. Gripper interface was demonstrated using test fixtures, not mock-up fuel assemblies.

Based on these conclusions, the Clamping Table has been judged acceptable for the normal IST.

5.2 RECOMMENDATIONS

As a result of the SOT performed, several recommendation have been made. These recommendations, along with those identified in Section 7.0 of the main body of this report, should be implemented for the next generation system. These recommendations are as follows:

- o Reevaluate the use of proximity switches for end-of-travel limit switches. These switches require extensive setup time, making them impractical for remote applications. They are also subject to sensing glitches which cause unalarmed faults.
- o Evaluate the addition of remotely viewable reference points which can be used to visually confirm position indications such as at the Clamping Table elevation homing elevation.
- o Evaluate the use of absolute resolvers for positioning. The homing sequence difficulties experienced with the proximity sensors could be eliminated with the use of an absolute positioning reference system.
- o Revise the HAND mode programming to go directly to the up set point after being at the last rod row.
- o Add alarming capabilities for a proximity sensor fault in homing and in general operations. If the target is lost, then immediately reacquired, the system just stops operating. There should be some method available to specifically identify this condition.
- o Rework the lower clamps to provide consistent closing force at the required set point. This will require mechanical modification to overcome the increasing friction problem with increasing load.
- o Provide a mechanical overtravel stop for the upper clamp swing bar. There is no protection for operator error in overdriving this clamp in the open direction.

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- o Reevaluate Clamping Table operating speeds in light of Process Control System time delays.
 - o The lower clamp opening capability should be increased to obtain a greater opening for W 17x17 fuel to accommodate the effects of bowing in the fuel assembly.
 - o Modify the Clamping Table elevation drive to avoid drifting down with the loss of power. This may require a modification to only allow table motion when driven. It can also be implemented electrically with a make-before-break function implemented for the motor brake.
 - o Resolve level discrepancy between the north and south Clamping Table positions and the resulting misalignment with the grippers. The south upper clamp position requires shimming to be at the same level as the south gripper when the north position is correctly aligned with the north gripper.
 - o Modify the design of the Clamping Table upper clamp slide so that Westinghouse assemblies are clamped at the upper or first grid rather than at the second. This would ensure that the ends of the rods are aligned vertically with the grippers. The current location at the second grid may not fully eliminate the effects of bowed fuel.
 - o Evaluate the desirability of adding internal cam switches or other end-of-travel switches for the Clamping Table's upper and lower clamp slides for JOG mode operations. The clamp slides are not intended to operate closer than one inch from the end of rail.
 - o Evaluate CCTV camera positioning for Clamping Table elevation drive M-106I faults. CCTV camera 3 provides partial coverage for the motor and no coverage for the drive train. If full drive train camera coverage is required, then another camera will be required.
 - o Evaluate the impact of the "Extraction Complete" interlock requirement for opening the Clamping Table clamps if fuel is present on off-normal operations. If fuel is present, then extraction must be completed before the clamps can be opened in the HAND mode. For the case that a fuel assembly is to be temporarily removed from the table to remove a stuck rod, we should maintain the extraction sequence active for the remaining assembly and for the return of the partially processed off-normal assembly.

ATTACHMENT 1
SYSTEM OPERATIONAL TEST PROCEDURE
FOR THE
CLAMPING TABLE
(WBS 1.3.2.1)
DOCUMENT NO. 9315-TP-202

Second Copy

Signature

Date 3/4/52

TEST PL. _____

CLIENT: DOE/Rod Consolidation

PROCEDURE NO.:

9315-TP-202

LOCATION: Cold Test Facility

REVISION NO.:

TITLE:

SYSTEM OPERATIONAL TEST PROCEDURE FOR CLAMPING TABLE

RELEASED FOR:

7

REVIEW

☒

TEST

SYSTEM OPERATIONAL TEST PROCEDURE FOR CLAMPING TABLE

(WBS 1.3.2.1)

QUALITY ASSURANCE
RECORD

APPROVED

PROJECT MANAGER

DATE _____

11/1/91

APPROVED

QUALITY ASSURANCE

DATE _____

11/1/91

APPROVED

DISCIPLINE MANAGER

DATE _____

10/31/91

APPROVED

AUTHOR

DATE _____

10	3	9
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[illegible]

NUS CORPORATION

REVISION CONTROL SHEETRevised Page No.Latest RevisionDate

Original

0

November 1, 1991

A11

1

November 27, 1991

5 of 7

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1.0 OBJECTIVE

The objective of this Test is to demonstrate that the clamping table system meets design requirements. This demonstration is shown by performing the test steps and meeting the acceptance criteria (Reference 11.2). The specific goals for this test are:

- Demonstrate that the table top levelness and travel performance under load conditions is as designed.
- Demonstrate that the upper and lower clamping ~~and rod alignment~~ mechanisms function as designed under ~~all loads~~ for PWR ~~and BWR~~ fuel assemblies. TRN 1
vna
7/24/92

2.0 PREREQUISITES

2.1 System set-up has been performed per the instruction of Appendix A.

Test Conductor	<u>Eric Forrest</u>	Date	<u>5/21/92</u>
QA	<u>W. M. [signature]</u>	Date	<u>5/21/92</u>

2.2 All test personnel participating in this test have been trained per the instructions of Section 6.4 of Reference 11.6. | 1

Test Conductor	<u>Eric Forrest</u>	Date	<u>5/21/92</u>
QA	<u>W. M. [signature]</u>	Date	<u>5/21/92</u>

2.3 Camera, film, lighting and personnel are available to take photographs per the instruction of Appendix C and the instruction in section 8.0. | 1

Test Conductor	<u>Eric Forrest</u>	Date	<u>5/21/92</u>
QA	<u>W. M. [signature]</u>	Date	<u>5/21/92</u>

2.4 The QA/QC Data Package has been prepared in accordance with Specification 9315-M-200, and the applicable Bill of Material, and is acceptable.

Test Conductor	<u>Eric Forrest</u>	Date	<u>5/21/92</u>
QA	<u>W. M. [signature]</u>	Date	<u>5/21/92</u>

2.5 The system has been assembled in accordance with all applicable Drawings, DCNs and FCRs of the QA/QC data package. | 1

Test Conductor	<u>Eric Forrest</u>	Date	<u>5/21/92</u>
QA	<u>W. M. [signature]</u>	Date	<u>5/21/92</u>

- 2.6 The Test Engineer/Conductor has been qualified and certified in accordance with QAP 2.0.

Test Conductor ERS Farnest Date 5/21/92
QA W. H. Mulgrew Date 5/21/92

- 2.7 The checklist contained in the Control System SOT (9315-TP-601) applicable to this system must be completed and the results accepted prior to the initiation of testing under this procedure.

Test Conductor ERS Farnest Date 5/21/92
QA W. H. Mulgrew Date 5/21/92

- 2.8 A limited access area with warning signs has been established around the equipment being tested.

Test Conductor ERS Farnest Date 5/21/92
QA W. H. Mulgrew Date 5/21/92

- 2.9 The system FAT has been completed and accepted by NUS.

Test Conductor ERS Farnest Date 5/21/92
QA W. H. Mulgrew Date 5/21/92

- 2.10 All equipment required to support this test as defined in Section 6.0 of this procedure is operational and calibrated as required.

Test Conductor ERS Farnest Date 5/21/92
QA W. H. Mulgrew Date 5/21/92

- 2.11 A visual inspection of the system being tested has been performed to verify there are no obstructions and/or damage to the equipment that may impact testing.

Test Conductor ERS Farnest Date 5/21/92
QA W. H. Mulgrew Date 5/21/92

2.12 The environmental conditions as defined in Section 4.0 are met.

Test Conductor E. B. Farnest Date 5/21/92

QA L. M. Mulgrew Date 5/21/92

2.13 Procedures for changeover of fuel types for the Control System are in place in the Control Room.

Test Conductor E. B. Farnest Date 5/21/92

QA L. M. Mulgrew Date 5/21/92

2.14 The RBT has been accepted by its FAT and is operational.

Test Conductor E. B. Farnest Date 5/21/92

QA L. M. Mulgrew Date 5/21/92

2.15 The PWR and BWR fuel assembly handling fixtures SOT has been completed.

Test Conductor E. B. Farnest Date 5/21/92

QA L. M. Mulgrew Date 5/21/92

2.16 CCTV cameras No. 3 and 7 are installed and are operational.

Test Conductor E. B. Farnest Date 5/21/92

QA L. M. Mulgrew Date 5/21/92

3.0 INITIAL TEST CONDITIONS

3.1 The PWR fuel assembly handling fixture is coupled both mechanically and electrically to the RBT.

Test Conductor E. B. Farnest Date 5/21/92

3.2 The control system is programmed to process ~~B&W~~ ^{W 17x17} 15x15 fuel type.

Test Conductor E. B. Farnest Date 5/21/92

3.3 The PWR clamps are mounted to the Clamping Table.

Test Conductor E. B. Farnest Date 5/21/92

3.4 Two B&W 15x15 mockup fuel assemblies have been loaded and placed on the 3rd Storage Shelf of the Fuel assembly Storage Rack, or are otherwise available for testing.

Test Conductor E. B. Farnest Date 5/21/92

3.5 Level reference surface established at the base of the clamping table.

Test Conductor E. B. Farnest Date 5/21/92

Blue not
to be
used
TRC #1
SAP
5/21/92
RL #1
Final

TRC #1
SAP
5/21/92

RL #2
TRC #1
SAP
7/13/92

4.0 ENVIRONMENTAL CONDITIONS

At least One HVAC unit for the control room and the air circulation system for the Test Cell should be operating and maintaining the test cell and control room temperatures in the ranges 60° to 90° and 65° to 85° respectively.

Test Conductor

WJF

Date

*5/21/92*5.0 SPECIAL PRECAUTIONS

- 5.1 All precautions, warnings and notes are addressed in the Detail Test Steps (Section 8.0), prior to the step to which they apply.
- 5.2 Care must be taken to ensure that the clamping table and adjacent equipment (if installed) do not collide while performing test operations.
- 5.3 Care must be taken when transporting mockup fuel assemblies during testing to ensure equipment is not damaged.

6.0 SPECIAL EQUIPMENT REQUIRED

IPQJ #6
WJF
5/10/92

6.1 Compression load test fixture (~~DWG 9315-M-0012~~) and cable assembly (SK-M-001). | 1

6.2 Micrometers or measuring devices with the following range:

6.2.1 0-10 inches

6.2.2 0-20 inches

6.2.3 0-70 inches

LEAVE AS
IS

WJF 5/21/92

6.3 Stop watch (calibration not required) | 1

6.4 Protractor with range of 0 to 90 degrees and accuracy of 0.1 degree.

6.5 Two test gauges which indicates centerline of fuel rod rows for W17 x 17, W15 x 15, and CE14 x 14 fuel types (calibration not required). | 1

7.0 TEST DATA RECORDING

7.1 Test Data Records

The test conductor shall designate one copy of the test procedure and its attachments as the "Record Copy" and shall ensure that this copy is maintained current. All test data, significant events, and observations must be recorded in this document. Additional sheets may be used as necessary, but must be permanently affixed to this report by staples and/or tape.

7.2 Test Procedure Modification

This section addresses the process for making modifications to the approved Test Procedure. These modifications will fall into one of three categories, as follows:

- Corrections are modifications to the procedure due to typos or incorrect information.
- Minor Changes are modifications which do not affect functional intent or acceptance criteria of the test.
- Major Changes are changes that affect functional intent or acceptance criteria.

Each of these modifications will be handled differently. If a correction is required to the procedure, it will be made with pen and ink in the "Record Copy", as they are found. The test conductor will make the appropriate change. Once the change is made, he will initial and date the change for future reference. All modifications which are considered minor changes must be documented on "Temporary Procedure Change Notice" (TPCN) forms (refer to Appendix D). This change shall be approved by the test conductor by annotating that the test procedures are using the TPCN form. All modifications which are considered a major change must also be documented on the TPCN form. However, when a major change is required, testing shall be halted until the TPCN is approved by the responsible Test Engineer, Test Conductor, Quality Assurance and Project Engineer.

7.3 Repairs/Retesting

This section addresses the process for making necessary repairs to the equipment and retesting of the system. If during testing a problem is observed which requires repair or rework of the equipment, testing shall be halted. If the repair/rework is minor, the Test Conductor will document the problem, cause, and corrective action implemented, the faulty system will be retested. All remaining tests will continue on until conclusion. If the problem requires redesign of the faulty system, all testing of this equipment will be halted. The problem and recommended solution will be documented and submitted to the Test Review Group (TRG) for approval. Once approval and the repair is complete, testing of the equipment will be accomplished in accordance with this procedure.

8.0 DETAILED TEST STEPS

The following sequences of tests are arranged per fuel type. All tests pertaining to a certain fuel are performed, then repeated for the next consecutive fuel type. The order in which these tests are performed will not have an impact on the results and can therefore be performed in any order as deemed appropriate by the test conductor.

10. Remove fuel from Clamp Position No. 2 and repeat steps 8 thru 10 two additional times.

NOTE

Photographs need not be taken for repeat testing.

1

Acceptance Criteria

- Control System indicates presence of fuel each time the mockup fuel assembly is placed into the clamp position.
- The remain position indicates NO fuel.

Test Conductor _____ Date _____

QA _____ Date _____

11. All Steps 1 thru 10 were completed.

Test Conductor _____ Date _____

TPCN
1/21/92
me

8.1.3

Verify Clamping Table loading as follows:

NOTE

This test sequence represents worst case loading of the table. Therefore this test sequence (Section 8.1.3) does not need to be repeated for the other fuel types.

WARNING

All personnel must be clear of test area during movement of the RBT. Care must be exercised when operating the RBT to avoid damage to the RBT or incell equipment.

1. With the RBT in 'Jog Mode' position the B&W 15x15 mockup fuel assembly into clamp position No. ~~X~~ 2.

NOTE

Insure the fuel assembly mockup is fully seated on clamps.

Acceptance Criteria

- Load indication is present at control station for position RL 15 No. ~~X~~ 2.

~~Center line of lower clamps align with lower end fitting of mockup fuel assembly.~~

~~Center line of upper clamps align with upper grid.~~

TCN 006

TCN 006

TPCN
7
6/5/92

TPCN
7

TPCN
7

Single path this
section is re-
formed as per
7/21/92
7/9/92
6/5/92

- Fuel assembly mockup was able to be installed via the RBT with PWR FAHF.

Test Conductor Fred G. Coleman Date 6/5/92
QA Clinton R. Claggett Date 6/5/92

2. ~~Drive clamps (upper and lower) to close position until they automatically shut off.~~

Acceptance Criteria

- ~~Lower clamps are in contact with the lower end fitting of the mockup fuel assembly.~~
- ~~Upper clamp bar is in contact with the upper grid of the mockup fuel assembly.~~

Test Conductor Fred G. Coleman Date 6/5/92 TCN 001
QA Clinton R. Claggett Date 6/5/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

3. Measure and record the distance from the table top to the floor at the identical points measured in test sequence ~~8.1.1.1 above.~~ ^{8.3.1.1 below.}
(Full down position) reference = 0

TCN 001
6/2/92

calibrated
measuring device
not required
JGC 6/3/92

Type of Measuring Device	Range
Identification No.	Calibration Due Date

Position	Distance
Northeast Corner	42 15/32
Northwest Corner	42 7/16
Southwest Corner	42 7/16
Southeast Corner	42 13/32

Acceptance Criteria

- All measurements are within $\pm .09$ inches.

Test Conductor Fred G. Coleman Date 6/5/92
QA Clinton R. Claggett Date 6/5/92

4. Index the table top up by pressing 'CONTINUE' between consecutive moves ^{7/6/92} until the 8th row of rods is in position for extraction operations. Measure and record the distance from the table top ~~to the floor~~ at the same points as measured in step 3 above. ~~vertical clamp reference surface~~

note: checked and passed 11/26/92

Type of Measuring Device Vernier Caliper Range 0-11.3"
Identification No. NUS-001 Calibration Due Date 11/26/92

Position	Distance
Northeast Corner	6.897
Northwest Corner	6.852
Southwest Corner	6.828
Southeast Corner	6.815

Acceptance Criteria

- All measurements are within $\pm .09$ inches.

Test Conductor Fred G. Coleman Date 6/5/92

QA Clinton R. Chappell Date 6/5/92

5. Index the table top to the full up position by pressing 'CONTINUE' between consecutive moves and measure and record the distance ~~from the table top to the floor~~ at the same points as measured in step 3 above. ^{7/6/92}

7/6/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

Type of Measuring Device Vernier Caliper Range 0-11.3"
Identification No. NUS-001 Calibration Due Date 11/26/92

Position	Distance
Northeast Corner	11.757 *
Northwest Corner	11.820 *
Southwest Corner	11.797 *
Southeast Corner	11.761 *

* includes thickness of spacer (= 0.742)

Acceptance Criteria

- All measurements are within $\pm .09$ inches.

Test Conductor Fred G. Coleman Date 6/5/92

QA Clinton R. Claggett Date 6/5/92

6. Drive table to its full down position. ~~and open clamps in position No. 1 and No. 2.~~ 7X 6/5/92

TPCN 7

NOTE

Observe all warning when moving fuel (refer to Step 1 above).

7. With the RBT in 'JOG MODE' remove the B&W 15x15 mockup fuel assembly from position No. ~~X~~ 2 and place it into position No. ~~X~~ 1 7X 6/5/92

TPCN 7
7/24/92

NOTE

Insure that the fuel assembly is fully seated within the clamps.

Acceptance Criteria

- Load indication is present at Control Station for position No. 2 7X 6/5/92
- ~~Center line of lower clamps align with lower end fitting of mockup fuel assembly.~~
- ~~Center line of upper clamps align with upper grid.~~
- Fuel assembly mockup was able to be installed via the RBT equipped with the PWR FAHF.

RL #15

TPCN 7
7/24/92

TCN 006 { TPCN 7
TPCN 7

Test Conductor Fred G. Coleman Date 6/5/92

QA _____ Date _____

8. Repeat Steps 2 thru 6 above.

Type of Measuring Device Vernier Caliper Range 0-11.3"

Identification No. NUS-001 Calibration Due Date 11/26/92

2ND reading
of Northeast
Corner

1ST 3.405

2ND 7.364

3RD 11.339

Sequence Position	1ST	2ND	3RD
Northeast Corner 3.570	42 ¹³ / ₃₂	7.527	11.330
Northwest Corner 3.349	42 ³ / ₈	7.310	11.310
Southwest Corner 3.399	42 ³ / ₈	7.380	11.408
Southeast Corner 3.400	42 ¹³ / ₃₂	7.375	11.500

11.350

Acceptance Criteria

- ~~Lower clamps are in contact with the lower end fitting of the mockup fuel assembly.~~
- ~~Upper clamp bar is in contact with the upper grid of the mockup fuel assembly.~~
- All measurements are within $\pm .09$ inches.

Test Conductor

W. J. Lewis (1st)

Date

6/5/92

QA

Clinton R. Claggett

Date

6/5/92

9. All test Step 1 thru 8 above have been completed.

Test Conductor

Date

Verify maximum loading of clamp table as follows:

NOTE

This test sequence represents worst case loading of the table. Therefore this test sequence section 8.1.4 does not need to be repeated for the other fuel types.

WARNING

All personnel must be clear of test area during movement of the RBT. care must be taken when operating the RBT to avoid damage to the RBT or other equipment.

~~1. Drive all clamp table clamps (upper and lower) to the open position.~~

TPCN 7

~~2. With the RBT in 'JOG' mode position the B&W 15x15 mockup fuel assembly in Clamp Position No. 2 into Clamp Position No. 1 on the clamping table.~~

~~3. Close clamping table clamps in position No. 1 and release RBT and FAHF from the mockup fuel assembly.~~

TPCN 7

Hand over
6/9/92

TPCN #7

TCN 006

As per this
section is
re-positioned by
TPCN 14 v. 7B11/92
7/2
6/5/92

7/2
6/5/92

7/2

7/2

4. Remove the second B&W 15x15 mockup fuel assembly from the storage rack and position it within clamp position No. 2 on the clamping table following the instructions 3 thru 8 of Section 8.1.2 above.
5. Close clamping table clamps in Position No. 2 and release RBT and FAHF from the mockup fuel assembly. Position RBT clear of the Clamping Table.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

6. Measure and record the distance from the top of the table to the floor at the identical points measured in test sequence 8.X.1.1 above. TDCW11
VNC
7/14/92

Type of Measuring Device _____	Range _____
Identification No. _____	Calibration Due Date _____

Northeast Corner 3.406

Northwest Corner 3.353

Southwest Corner 3.376

Southeast Corner 3.423

*Note: checked over pencil
VNC 9/12/92*

Acceptance Criteria

- All measurements are within $\pm .09$ inches.

Test Conductor J. S. Bullock Date 6/8/92

QA Clinton J. Cleghorn Date 6/8/92

7. Index the table top up by pressing 'Continue' between consecutive moves until the 8th row of rods is in position for extraction operations. ~~Record motor torque.~~ Measure and record distance from top of the table to the floor at the same points measured in step 6 above, and measure and record the deflection at the center of the table. RL #9

*TDCW2
7/13/92*

Type of Measuring Device _____	Range _____
Identification No. _____	Calibration Due Date _____

RL #9

*Note: checked over
pencil
VNC 9/12/92*

Type of Measuring Device <u>vernier Caliper</u>	Range <u>12" in .001" increments</u>
Identification No. <u>NUS-001</u>	Calibration Due Date <u>11/26/92</u>

Type of Measuring Device _____	Range _____
Identification No. _____	Calibration Due Date _____

*TPCW #2
RL #9*

~~Motor Torque~~ ~~+++++~~

Distance *Second reading*

- Northeast Corner 7.379 7.380

- Northwest Corner 7.342 7.346

- Southwest Corner 7.359 7.345

- Southeast Corner 7.377 7.373

Deflection _____

Acceptance Criteria

- ~~Motor Torque $\leq$ to 5.4 ft-lbs for each operation.~~
- All measurements at the corners are within $\pm .09$ inches.
- Deflection is less than 0.06 inch from unloaded condition.

Test Conductor J. M. Sabello Date 6/8/92

QA Clinton K. Claggett Date 6/8/92

8. Index the table top to the full up position by pressing 'CONTINUE' between consecutive moves and measure and record the same parameters defined in step 7 above.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

Type of Measuring Device Vernier Caliper Range 0-12" in .001" incr.

Identification No. NUS-001 Calibration Due Date 11/26/92

~~Type of Measuring Device _____ Range _____~~

~~Identification No. _____ Calibration Due Date _____~~

~~Type of Measuring Device _____ Range _____~~

~~Identification No. _____ Calibration Due Date _____~~

*TPCW 2
RL #9
VWC
7/23/92*

~~Motor Torque~~ ~~+++++~~

Distance

- Northeast Corner 11.357
- Northwest Corner 11.311
- Southwest Corner 11.361
- Southeast Corner 11.343

Deflection _____

Acceptance Criteria

- ~~Motor Torque $\leq$ to 5.4 ft-lbs for each operation.~~

*TPCW 2,
RL #9
VWC
7/23/92*

- All measurements at the corners are within $\pm .09$ inches.
- Deflection is less than 0.06 inch from unloaded condition.

Test Conductor J M Bullo Date 6/8/92

QA _____ Date _____

30X 6/8/92

9. All test steps ⁴ thru 8 above have been completed.

Test Conductor J M Bullo Date 6/8/92

8.1.5 Verify rod extraction system interface as follows:

1. If clamp table top is not in full down position, reverse direction and drive table top down until the drive motor automatically turns off,
2. Measure and record the distance from a fixed reference surface to the center line through the pullhead grippers. | 1

NOTE

A different reference point can be used.

Type of Measuring Device _____ Range _____

Identification No. _____ Calibration Due Date _____

Distance for Pull Head A _____

Distance for Pull Head B _____

NOTE

Reference design distance is 61.88 inches.

Test Conductor _____ Date _____

QA _____ Date _____

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

3. Drive Clamp table top up until it automatically turns off. Measure and record the distance from the fixed reference surface (Step 2 above) to the center line of the top row of fuel rods for each assembly. | 1

NOTE

A reference gage may be required to mark position of rods since the rods are enclosed by the top end fitting of the mockup fuel assembly.

TPCN
1
VIL-712/92

8.1.6 Verify clamp table interface loads as follows:

NOTE

~~This test sequence represents worst case loading of the table from the extraction process. Therefore this test sequence (Section 8.1.6) does not need to be repeated for the other fuel types.~~

1. ~~Place the clamping table into the full down position.~~
Place the Clamping Table in the Full Up position.
2. Open both upper and lower clamps for both fuel positions (No. 1 and No. 2).
3. Using the RBT in 'JOG' mode remove both mockup fuel assemblies (Position No. 2 first and Position No. 1 second) from the clamping table and place them back into the fuel assembly storage rack by reversing the procedure Steps 3 thru 8 of Section 8.1.2 above.
4. Remove upper clamp assembly from the table and install load test fixture (9315-M-0016, GRP 1) in its place.
5. ~~Connect one end of the cable assembly to the clamping table and the other end to both pull head carriages (A and B).~~
Connect the test fixture to one pull head carriage. Either pull head is acceptable.
6. ~~Measure and record the distance between the east edge of the clamping table top and the west face of the consolidation table as a reference.~~

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

Type of Measuring Device Caliper Range 12"
Identification No. 17LS Calibration Due Date 5/26/92

N. Distance 2.365 measured from each corner
S. Distance 2.920

Test Conductor Eric Fung Date 6/9/92
QA Clinton K. Chagitt Date 6/9/92

WARNING

Care must be taken when applying the load to the clamping table. Visually observe clamping table and rod pull head carriages A and B during operation to insure table is not damaged.

TPC #9
7/22/92
7/22/92

7. ²⁶⁰⁰ Slowly drive both pull head carriages ^{+250/50 1/2 7/22/92} equal distances to take up the slack in the cable until the load cell in the load fixture measures ~~340A~~ ^{340A} ± 50 lbs. Remeasure the distance (refer to Step 6 above) between the tables.

~~A hydraulic ram can be used in place of the cable assembly.~~

Type of Measuring Device Caliper Range 12"
Identification No. 1725 Calibration Due Date 5/22/92

Acceptance Criteria

- Difference between this measurement and the reference measurement (Step 6) is ≤ 0.09 inches.

Test Conductor Eric Hargis Date 6/9/92
QA Clinton R. Clayton Date 6/9/92

8. Slowly release tension in the load fixture and remove from the clamping table.

WARNING

Keep hand clear of clamp jaws when inserting load fixture (DWG 9315-M-0010, GRP 2) into the clamps.

TPC #9
7/22/92
7/22/92

9. ~~Insert tubes feel mark up fuel assembly test fixture into position 1. Drive lower clamps (Clamp Position No. 1) to the open position and insert load fixture (DWG 9315-M-0010, GRP 2).~~
10. Temporary support load fixture in position.
11. Close clamp until motor automatically shuts off.
12. Connect the cable on the load fixture to pull head carriage drive.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

WARNING

Attach a safety strap to load fixture

CAUTION

If the fixture starts to move stop cranking cable hoist fixture. Release tension in cable and determine cause of movement.

1100 #9
7/22/92
JAC 7/22/92

13. Apply an extraction force of 1300 ± 100 lbs.
~~Slowly crank the cable hoist puller to take up the slack in the cable until the load cell in the load fixture measures 2400 lbs to 3500 lbs.~~

1300 $\pm$ 100

Acceptance Criteria

- Load test fixture was not pulled free of clamps.

SMF
6/10/92

Test Conductor 200 Forrest Date 6/10/92

QA Clinton R. Claggett Date 6/10/92

14. Repeat Steps 9 thru 13 above for clamp Position No. 2.

Acceptance Criteria

- Load test fixture was not pulled free of clamps.

Test Conductor 200 Forrest Date 6/10/92

QA Clinton R. Claggett Date 6/10/92

15. Remove load test fixture from clamping table and replace upper clamp assembly.

16. Test Steps 1 thru 15 were completed.

Test Conductor 200 Forrest Date 6/10/92

QA Clinton R. Claggett Date 6/10/92

8.1.7 Interlock Verification Test

- 8.1.7.1 Verify the lower clamp drive (M-106A) can be driven back (west) as follows:

1. Place the control system in 'HAND' mode of operation.
2. Drive the lower clamp (M-106A) to its full forward position.
3. Impose the condition of 'Fuel Present' in clamp position No. 1 by temporarily forcing the data register.
4. Drive lower clamp (M-106A) in back (west) direction.

Acceptance Criteria

- Clamp drive (M-106A) does not operated.

Test Conductor _____ Date _____

QA _____ Date _____

TPCW
#1
7/23/92

8.3 System Verification for the W 17x17 fuel type

8.3.1 Drive System Operation Verification Test

WARNING

Keep clear of system during operation

8.3.1.1 Verify the elevation drive (M-106I) as follows:

1. Switch the control system to the HAND mode and drive the elevation drive down until it automatically shuts off.
2. ~~Connect instrument leads to the drive motor (M-106I) for measuring torque.~~
3. Measure and record the distance from the top of the table (DWG 9315-S-2109, item 14) to the reference surface at each corner.

Type of Measuring Device TAPE Range 12'
Identification No. N/A Calibration Due Date N/A

Position	Distance
Northeast Corner	46 ¹³ / ₁₆
Northwest Corner	46 ¹ / ₂
Southwest Corner	46 ¹ / ₁₆
Southeast Corner	46 ¹³ / ₁₆

Recheck of Dim.
46 ¹³/₁₆
46 ³/₄
46 ¹/₁₆
46 ⁵/₈

Acceptance Criteria

- All measurements are within $\pm .09$ inches.

Test Conductor S. S. Furest Date 7/21/92

QA 1st July 92 Date 5/21/92

26105T
vme 713192

OPEN #2
SAFE

See
RLA3
Re test
me 7/13/92

4. Drive the table top up until it automatically shuts off. Record motor torque and measure and record the distance from the top of the table to the reference surface at the same points measured in Step 3 above.

Type of Measuring Device _____	Range _____
Identification No. _____	Calibration Due Date _____

TORQUE _____

Distance

- Northeast Corner 47 1/8
- Northwest Corner 47 3/16
- Southwest Corner 47 1/8
- Southeast Corner 47 1/16

Acceptance Criteria

- Torque $\leq$ to 5.4 lb - ft.
- All measurements above are within ± 0.09 in.

Test Conductor SA Faust Date 5/21/92

QA _____ Date _____

5. Press "CONTINUE" on the control console to drive the table top up. When motor automatically shuts off, record the distance from the top of the table to the reference surface at the same points measured in Step 3 above.

4
me 8/15/92

Type of Measuring Device _____	Range _____
Identification No. _____	Calibration Due Date _____

See
RL#7
Re-test
m-2/13/92

TORQUE _____

Distance _____

- Northeast Corner 47 9/16
- Northwest Corner 47 5/8
- Southwest Corner 47 9/16
- Southeast Corner 47 1/2

Acceptance Criteria

- Torque $\leq$ to 5.4 lb - ft.
- All measurements above are within ± 0.09 in.
- The difference between respective measurements between the respective measurements from this step and the previous step above is 0.496 ± 0.01 in.

RL 3
m-2/21/92

Test Conductor E. J. Forest Date 5/21/92

QA _____ Date _____

6. Repeat Step 5 above 15 additional times until the table is in the full-up position.

Type of Measuring Device _____ Range _____

Identification No. _____ Calibration Due Date _____

TPCN #2,
RL 9

Sequence	Torque	Distance			
		Northeast	Northwest	Southwest	Southeast
1		4.342	4.366 *	4.336	4.348
2		4.847	4.857	4.823	4.837
3		5.337	5.353	5.325	5.338
4		5.830	5.855	5.829	5.824
5		6.328	6.341	6.331	6.334 *
6		6.814	6.848 *	6.827	6.828
7		7.321 *	7.349	7.327	7.310 *
8		7.805 *	7.832 *	7.819	7.816
9		8.299	8.330	8.311	8.309
10		8.797	8.832	8.810	8.805
11		9.299	9.336	9.306	9.304
12		9.795	9.834	9.808	9.793
13		10.289	10.325	10.306	10.285
14		10.789	10.819	10.798	10.787
15		11.282	11.309	11.289	11.272 *
		11.034	11.067	11.049	11.041

RL #4

RL #4

RL #4

RL #4

RL #4

RL #4

RL #4

RL #4

5 / 7.336 / 7.358 / 7.389

Notes: linked over pencil
vnc 9/20/92

0 / 11.354 / 11.325 / 11.365

Acceptance Criteria

11.776

11.809

11.791

11.783

RL #4

Spacer is .742" wide

TPCN #2, vnc 9/20/92
RL 9

• Torque is to 5.4 lb - ft.

- All measurements above are within ± 0.09 in.
- The difference between respective measurement between the measurements taken in the previous sequence is 0.496 ± 0.01 in.
- The difference between the respective measurements taken in the full down position (Step 13 above) and the full-up position (Sequence No. 15) is 11.62 ± 0.15 in.

Test Conductor

Paul J. Coleman
C.R. Claggett

Date

5/29/92

QA

Date

5/29/92

RL #4

RL #4

7. Reverse direction and drive table top down until it automatically shuts off. Measure and record ~~motor torque~~ time of travel, and the distance from the table top to the reference surface at the same points measured in Step ~~3~~₄ above. TPCN #2
6/1/92

TPCN #2, ^{WMS}
RL #9

TORQUE

Time

Distance

- Northeast Corner

- Northwest Corner

- Southwest Corner

- Southeast Corner

~~|||||~~

49.0 sec

3.350

3.358

3.347

3.354

NOTE: changed
the resolver motor speed
from 16,000 counts/sec
to 23,000 counts/sec
7/1/92
dlg

Acceptance Criteria

TPCN #2, ^{WMS}
RL #9

~~— Torque ≤ to 5.4 lb - ft.~~

• Total time ≤ 1.3 minutes. ✓

• The difference between respective measurements above and in the full-up position (Test Sequence No. 15, Step 6) is 11.62 ± .15 inches.

• All measurements above (Step 7) are within ±.09 inches. ✓

Test Conductor

Fred S. Coleman

Date

6/1/92

QA

C.R. Claggett

Date

6/1/92

8. All tests Step 1 through 7 above have been performed.

Test Conductor

Fred S. Coleman

Date

6/1/92

8.3.1.2 Verify the ^{upper} clamp slide (M-106A) drive as follows:

1. Switch the control system to the ~~HAND~~ mode and drive the clamp slide back until it automatically shuts off.
2. Temporarily mark the clamp slide for a reference point to measure saddle travel from.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

3. Drive the clamp slide saddle forward until it automatically stops and measure the distance traveled, and the distance from the Saddle to the end of travel rails.

Type of Measuring Device Tape Measure Range
Identification No. N/A Calibration Due Date N/A

Distance to end of rails 14 1/2
Travel Distance 4 3/4

Acceptance Criteria

- ~~The distance to end of rails is 1.00 ±.03 inches.~~
- Saddle travel is ~~16.00 ±.03 inches.~~

Test Conductor ES Fareast Date 5/21/92
QA M. Hildgreen Date 5/21/92

4. Drive the clamp slide saddle back and measure the distance from the saddle to the end of rails.

Type of Measuring Device Tape Measure Range
Identification No. N/A Calibration Due Date N/A

Distance to end of rails 1 1/4 "
Travel Distance 4 3/4 "

Acceptance Criteria

- ~~The distance to end of rails is 1.00 ±.03 inches.~~
- Saddle travel is ~~16.00 ±.03 inches.~~

Test Conductor ES Fareast Date 5/21/92
QA M. Hildgreen Date 5/21/92

5. Repeat Steps 3 and 4 two additional times.

Type of Measuring Device	<u>Tape Measure</u>	Range	
Identification No.		Calibration Due Date	<u>N/A</u>

	FORWARD	BACKWARD
Distance to end of rails	<u>14 1/4</u>	<u>1 1/4</u>
Travel Distance	<u>4 3/4</u>	<u>4 3/4</u>
Distance to end of rails	<u>14 1/4</u>	<u>1 1/4</u>
Travel Distance	<u>4 3/4</u>	<u>4 3/4</u>

Acceptance Criteria

- ~~The distance to end of rails is 1.00 ±.03 inches.~~
- Saddle travel is ^{4 3/4}16.00 ±.03 inches.

TPCN 15
5/30/92

Test Conductor E. J. Farnett Date 5/21/92
QA H. J. Farnett Date 5/21/92

6. The above steps have been completed.

Test Conductor E. J. Farnett Date 5/21/92

8.3.1.3 Verify the lower ^{end clamp, position "1"}(M-106C) drive system and function as follows:

- Switch the control system to the HAND mode on the control screen and drive the clamp to the closed position until it automatically shuts off.

Test Conductor Fred G. Coleman Date 6/1/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

- Reverse motor direction and drive the clamp (M-106C) open until it automatically shuts off. Measure the opening between the clamp jaws (DWG 9315-M-2114, Item 13).

Type of Measuring Device	<u>Caliper</u>	Range	<u>0-11.3 in.</u>
Identification No.	<u>NUS-001</u>	Calibration Due Date	<u>11/26/92</u>

Distance between clamps jaws 10.073"

CL # 10,
JAC CN
002
5/21/92

TPCN
11
5/21/92

Acceptance Criteria

TPCN 18
viii
7/31/92

- The distance between clamp jaws is ~~10.42 ± 0.03~~ inches. ^{> 10.265 inches For bowed Fuel.}

Test Conductor Fred G. Coleman Date 6/1/92 RL #6

QA C. R. Claggett Date 6/1/92

- Reverse motor direction and drive the clamp (M-106C) closed until it automatically shuts off. Measure the distance between the clamp jaws.

Type of Measuring Device	<u>CALIPER</u>	Range	<u>0-11.3"</u>
Identification No.	<u>NUS-001</u>	Calibration Due Date	<u>11/26/92</u>

Distance between clamp jaws 8.003"

Acceptance Criteria

TPCN 18
viii
7/31/92

- The distance between clamp jaws is ~~8.22 ± 0.03~~ inches. ^{< 8.15}

Test Conductor Fred G. Coleman Date 6/1/92 RL #7

QA C. R. Claggett Date 6/1/92

- Repeat Steps 2 and 3 above two additional times.

Type of Measuring Device	<u>CALIPER</u>	Range	<u>0-11.3"</u>
Identification No.	<u>NUS-001</u>	Calibration Due Date	<u>11/26/92</u>

Distance between clamp jaws (open) 10.062 10.062 RL #6

Distance between clamp jaws (closed) 8.008 ~~8.22~~ 7.991 RL #7

Acceptance Criteria

TPCN 18
viii
7/31/92

- The distance between (clamp jaws when Open is ~~10.42 ± 0.03~~ inches. ^{> 10.265 inches For bowed Fuel.}
- The distance between (clamp jaws when Closed is ~~8.22 ± 0.03~~ inches. ^{< 8.15 inches}

Test Conductor Fred G. Coleman Date 6/1/92 RL #6,7

QA C. R. Claggett Date 6/1/92

5. If not in open position switch Controller to Hand Mode on control screen and drive clamps motor (M-106C) open until it automatically shuts off.

Test Conductor Fred G. Coleman Date 6/1/92

WARNING

Keep hands clear of clamp jaws when inserting compression load test fixture in clamps.

TPCN #6 ^{rev} 7/11/92

6. Insert the compression load test fixture (~~DWG 9315-M-0016, Group 2~~) between the clamp jaws. Temporary support the fixture in the clamp. [8.41"]

Test Conductor Fred G. Coleman Date 6/1/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

7. Drive the clamps closed until motor (M-106C) automatically shuts off and record force exerted by the clamps.

Test Conductor Fred G. Coleman Date 6/1/92

Type of Measuring Device COMPRESSION GAUGE Range 0-2000 #
Identification No. X92274 Calibration Due Date 10/8/92

Clamp Force 920 #

RL #8

TPCN 18
rev
7/11/92

Acceptance Criteria

700 to 1200
~~1000-1100~~

- Clamp force is between ~~1900-2000~~ lbs.

TCN #005

Test Conductor Fred G. Coleman Date 6/1/92

QA Clinton R. Claggett Date 6/1/92

8. Open clamps and repeat Steps 7 and 8 two additional times.

Type of Measuring Device Compression Gauge Range 0-2000 #
Identification No. X92274 Calibration Due Date 10/8/92

Clamp Force 830 # 1070 # 1040 # 840 # 880 #

TPCN 18
rev
7/11/92

Acceptance Criteria

700 to 1200
~~1000-1100~~

- Clamp force is between ~~1900-2000~~ lbs.

TCN #005

Test Conductor Fred G. Coleman Date 6/2/92

QA Clinton R. Claggett Date 6/2/92

RL #8

798
6/2/92

TRAIN
7/13/92

9. Repeat Steps 1 through 8 above for ~~second~~ ^{lower end} clamp ~~motor~~ ^{drive, Position "2"} (M-106D).

Type of Measuring Device CALIPER Range 0-11.3"
Identification No. NUS-501 Calibration Due Date 11/26/92

Type of Measuring Device COMPRESSION GAUGE Range 0-2000#
Identification No. X 92274 Calibration Due Date 10/8/92

Distance between clamp jaws (open) 10.036 10.033 10.051 RL #8

Distance between clamp jaws (closed) 8.061 8.077 8.061 RL #7

Clamp force 740# 750# 760# 760# 800#

Acceptance Criteria

TCN 14
vnc
7/11/92

- The distance between clamp jaws (open) is ~~10.42 ± 0.03 inches~~ ^{> 10.265 inches for bowed fuel}
- The distance between clamp jaws (closed) is ~~8.22 ± 0.03 inches~~ ^{< 8.16 inches}
- Clamp force is between ~~1900-2000 lbs.~~ ^{1000-1100 700 to 1200}

TCN 005

Test Conductor Fred G. Coleman Date 6/2/92

QA Clinton R. Clagett Date 6/2/92

8.3.1.4 Verify the ^{LOWER} ~~upper~~ END clamp slide (M-106B) drive system as follows:

- Switch the control system to the HAND mode and drive the clamp slide saddle back until it automatically shuts off.
- Temporarily mark the clamp slide for a reference point to measure saddle travel from.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

- Drive the clamp slide saddle forward and measure the distance traveled and the distance from saddle to end of rail.

5721/92
-CN 10
-performs
this test
vnc 7/13/92

798 6/2
-librated instrument
if required - see
TCN 002

Type of Measuring Device _____ Range _____
Identification No. _____ Calibration Due Date _____

Distance from saddle to end of rails* 15'16"
Travel Distance 21'13/32"
or hand stop.

Acceptance Criteria

RL #10,
TCN 002

- ~~• The distance from saddle to end of rails is 1.00 ±.03 inches.~~
- ~~• Saddle travel is 16.00 ±.03 inches.~~

Test Conductor Paul J. Coleman Date 6/3/92

QA Clinton R. Claggett Date 6/3/92

4. Drive the clamp slide saddle back and measure distances from saddle to the end of rails and distance traveled.

calibrated inst.
not required.
Refer to TCN 002
Jorge 6/2/92

Type of Measuring Device	Range
Identification No.	Calibration Due Date

Distance from saddle to end of rail _____

Travel Distance _____

Jorge
6/3/92

Acceptance Criteria

- ~~• The distance from saddle to end of rail is 1.00 ±.03 inches.~~
- ~~• Saddle travel is 16.00 ±.03 inches.~~

Test Conductor _____ Date _____

QA _____ Date _____

5. Repeat steps 3 and 4 two additional times.

calibrated inst.
+ required: refer
TCN 002
Jorge 6/2/92

Type of Measuring Device	Range
Identification No.	Calibration Due Date

TCN 002,
RL #10

~~Distance from saddle to end of rails~~
~~Travel Distance~~

FORWARD BACKWARD
||||| |||||

Jorge
6/3/92

~~Distance from saddle to end of rails~~
~~Travel Distance~~

||||| |||||

OK as is - do not
delete
Jorge
6/2/92

Acceptance Criteria

- The distance from saddle to end of rail is $1.00 \pm .03$ inches.
- Saddle travel is $16.00 \pm .03$ inches.

Test Conductor _____ Date _____

QA _____ Date _____

6. The above steps have been completed.

Test Conductor _____ Date _____

TPEN 17 7/31/92
TEST
7/2/92
8.3.1.5 Verify the ~~lower~~ ^{UPPER END POSITION} clamp slide (M-106E2) drive system and function as follows:

1. Switch the control system to the HAND mode on the control screen and drive the clamp to the open position until it automatically shuts off.

Test Conductor Fred G. Coleman Date 6/2/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

2. Reverse motor direction and drive the clamp (M-106E2) close until it automatically shuts off. Measure the opening between the clamp bar (DWG 9315-M-2116, Item 3) and fuel assembly cradle (DWG 9315-M-2116, Item 2).

Type of Measuring Device	<u>Vernier Caliper</u>	Range	<u>0-11.3"</u>
Identification No.	<u>NUS-001</u>	Calibration Due Date	<u>11/26/92</u>

Distance between clamp jaws 8.019 in.

Acceptance Criteria

- TPEN 17 7/31/92*
- The distance between clamp jaws is ~~7.22~~ ^{< 8.15} $\pm .03$ = .06 inches.

Test Conductor Fred G. Coleman Date 6/2/92

QA Christopher Daggett Date 6/3/92 *RL412*

3. Reverse motor direction and drive the clamp (M-106E2) open until it automatically shuts off.

4. Repeat Steps 2 and 3 above two additional times.

Type of Measuring Device Vernier Caliper Range 0-1.3"
Identification No. NU5-001 Calibration Due Date 11/26/92

Distance between clamp bar and fuel assembly cradle (closed)

8.007 in.

8.031 in.

Acceptance Criteria

- The distance between clamp bar and fuel assembly cradle is $7.22 \pm .03$ inches.
_{2.8.15}

Test Conductor Fred G. Coleman

Date 6/3/92

QA

Clinton H. Clagett

Date 6/3/92

RL #12

5. If not in open position, switch controller to Hand Mode on controls screen and drive clamps motor (M-106E2) open until it automatically shuts off.

Test Conductor Fred G. Coleman

Date 6/3/92

WARNING

Keep hands clear of clamp when inserting compression load test fixture in clamps.

6. Insert the compression load test fixture (DWG. 9315-M-0016, Group 2) between the clamp bar and fuel assembly cradle. Temporary support the fixture in the clamp.

Test Conductor Fred G. Coleman

Date 6/3/92

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

7. Drive the clamps closed until motor (M-106E2) automatically shuts off and record force exerted by the clamp.

Type of Measuring Device Compression Gauge Range 0-2000#
Identification No. X92274 Calibration Due Date 10/8/92

Clamp Force 1600#

Acceptance Criteria

- Clamp force is 160 ± 200 lbs.
_{160 to 200}

Test Conductor Fred G. Coleman

Date 6/3/92

QA

Clinton H. Clagett

Date 6/3/92

RL #15

8. Open clamps and repeat step 7 and 8 two additional times.

Type of Measuring Device Compression Gauge Range 0-200 #
Identification No. X 92274 Calibration Due Date 10/8/92

Clamp force 170 # 185 #

Acceptance Criteria

REC-14
7/24/92 • Clamp force is ^{160 to 200}~~190~~ ± 10 lbs.

RL #13

Test Conductor Fred S. Coleman Date 6/3/92

QA Clinton K. Clayton Date 6/3/92

9. Repeat steps 1 thru 8 above for second clamp motor (M-106G2).

Type of Measuring Device Vernier Caliper Range 0-11.3 in.
Identification No. NVS-001 Calibration Due Date 11/26/92

Type of Measuring Device Compression Gauge Range 0-200 #
Identification No. X 92274 Calibration Due Date 10/8/92

Distance between clamp bar
and cradle

7.966 in 7.985 in 7.891 in

RL #12.

Clamp force

190 # 180 # 200 #

Acceptance Criteria

Distance between clamp bar and cradle is 7.22 $\pm$.03 - .06
inches.

REC-14
7/24/92 • Clamp force is ^{160 to 200}~~190~~ ± 10 lbs.

Test Conductor Fred S. Coleman Date 6/3/92

QA Clinton K. Clayton Date 6/3/92

TPCN 11
7/24/92
3.2.2 Verify operation of load cells in clamp positions No. 1 and No. 2 as follows.

- TPCN 10
VME
7/31/92
1. Place the clamps into the Hand Mode of operation and drive all clamps upper and lower to the open position.
 2. Drive lower clamp, ^{slide} motor (M-106A) and upper clamp, ^{slide} motor (M-106B) in position to receive a fuel assembly.

WARNING

All personnel must be clear of test area during movement of the RBT. Care must be exercised when operating the RBT to avoid damage to the RBT or incell equipment.

- TPCN 13
VME
7/24/92
3. Place the RBT in 'JOG Mode' on the control screen at 50% speed, ^{or} ~~hand mode.~~
 4. ^{Local} Jog RBT in position above a ^{100 lb} test weight in the cell. ~~laydown area.~~
 5. ~~Lower the auxiliary hoist and hook it to the test weight.~~ ^{Pick up}
 6. ~~Lift the test weight until it will clear the clamps on the clamping table (-75 inches off the floor)~~ ^{W17x17}
 7. Maneuver ^{W17x17} test weight in position over lower clamp assembly Clamp Position No. 1 and lower onto clamp assembly support (9315-M-2114, item 3) plate

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

NOTE

Insure that the total weight is full seated on the clamp.

Acceptance Criteria

- Control System indicates presence of fuel in Clamp Position No. 1.
- Control System indicates NO fuel in Clamp Position No. 2

Test Conductor _____ Date _____

QA _____ Date _____

TPCN 16
vrc
7/31/92

TPCN 13
vrc
7/24/92

8. Remove ^{W17x17} test weight from Position No. 1 and move it to clamp position No. 2.

Acceptance Criteria

- Control System indicates NO fuel in Clamp Position No. 1.
- Control System indicates presence of fuel in Clamp Position No. 2.

TPCN 13
vrc
7/24/92

9. Remove ^{W17x17} test weight from Clamp Position No. 2 and repeat steps 7 thru 8.

Acceptance Criteria

- Control System indicates presence of fuel each time the mockup fuel assembly is placed into the clamp position.
- The remain position indicates NO fuel.

Test Conductor _____ Date _____

QA _____ Date _____

10. All Steps 1 thru 9 were completed.

Test Conductor _____ Date _____

~~8.3.3 Verify rod extraction system interface as follows:~~

1. If clamp table top is not in full down position reverse direction and drive table top down until the drive motor automatically turns off.
2. Measure and record the distance from a fixed reference surface to the center line through the pull head grippers.

Type of Measuring Device _____	Range _____
Identification No. _____	Calibration Due Date _____

Distance for Pull Head A _____

Distance for Pull Head B _____

NOTE: Reference design distance is 61.88 inches.

Test Conductor _____ Date _____

QA _____ Date _____

EST
PCN
8
vrc
7/24/92
2, TPCN 16
vrc
7/31/92

3. Clamp ~~both~~ fuel rod row indicator gages for W 17x17 onto the top of the clamping table in the same position as the fuel assembly would be in.

4. Drive Clamp table top up until it automatically turns off. Measure and record the distance from the fixed reference surface (Step 2 above) to the centerline of the top row of fuel rods on both indicators (refer to Step 3 above).

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

Type of Measuring Device _____	Range _____
Identification No. _____	Calibration Due Date _____

Distance Clamp Position No. 1 _____
Distance Clamp Position No. 2 _____

Acceptance Criteria

- The difference between the respective measurements in Step 4 and Step 2 are within $\pm .01$ inches.

Test Conductor _____ Date _____

QA _____ Date _____

5. Index Clamp table up one row by pressing 'Continue' on Control Console and take the same measurement as in Step 4 above to the

Type of Measuring Device _____	Range _____
Identification No. _____	Calibration Due Date _____

CENTER LINE OF THE SECOND ROW.

Distance Clamp Position No. 1 _____
Distance Clamp Position No. 2 _____

Test Acceptance Criteria

- The differences in the respective measurements and reference measurements are within $\pm .01$ inches.

Test Conductor _____ Date _____

QA _____ Date _____

TEST #142
TPC 2
8
8/15/92

43F
4/5/92

6. Repeat step 5 above by pressing 'Continue' between consecutive operations until all 17 rows of rods have been measured.

NOTE

Photographs need not be taken of all rows. Photographs must be taken of the center row and last row as a minimum.

Type of Measuring Device _____ Range _____

Identification No. _____ Calibration Due Date _____

Row

Clamp Position No. 1

Clamp Position No. 2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

Acceptance Criteria

- The difference in the respective measurements and the reference measurements are within $\pm .01$ inches.

Test Conductor _____ Date _____

QA _____ Date _____

7. All test steps 1 thru 6 above have been completed.

Test Conductor _____ Date _____

RETEST TRCN 7/14/92
TICK 8
by 6/5/92

8.3.4 Interlock Verification Test

TPEN 11
7/24/92

8.3.4.1 Verify the lower ^{end} clamp ^{slide} drive (M-106^B~~A~~) can be driven back (West) as follows:

TPR
5/26/92

1. Place the control system in 'HAND' mode of operation.
2. Drive the lower clamp ^{slide} drive (M-106^B~~A~~) to its full forward position. ^{EAST}
3. Impose the condition of 'Fuel Present' in clamp position No. 1 by temporarily forcing data register. | 1
4. Drive lower clamp ^{slide} drive (M-106^B~~A~~) in back (West) direction. ^{TPR}
7/26/92

Acceptance Criteria

TPEN 11
7/24/92

- Clamp ^{slide} drive (M-106^B~~A~~) does not operate.

Test Conductor J. G. Coleman

Date 5/26/92

QA

C. R. Cheyette

Date 5/26/92

5. Impose the condition of 'No Fuel Present' in either clamp positions No. 1 and No. 2 by temporarily forcing data register. | 1

TPEN 11
7/24/92

6. Drive lower clamp ^{slide} drive (M-106^B~~A~~) in back (West) direction. ^{TPR}
5/26/92

Acceptance Criteria

TPEN 11
7/24/92

- Clamp ^{slide} drive (M-106^B~~A~~) operates in back direction.

Test Conductor J. G. Coleman

Date 5/26/92

QA

C. R. Cheyette

Date 5/26/92

7. Repeat steps 2 thru 6 above for clamp position No. 2.

Acceptance Criteria

TPEN 11
7/24/92

- Clamp ^{slide} drive (M-106^B~~A~~) does not operate when 'Fuel Present' condition imposed ^{TPR}
5/26/92
- Clamp ^{slide} drive (M-106^B~~A~~) operates when 'No Fuel Present' condition imposed. ^{TPR}
5/26/92

Test Conductor J. G. Coleman

Date 5/26/92

QA

C. R. Cheyette

Date 5/26/92

TPCN 11
7/24/92

8. Reverse lower clamp, ^{slide} drive (M-106A) ^B direction and repeat steps 3 thru 7 above. ³⁹² 5/26/92

Acceptance Criteria

TPCN 11
7/24/92

- Clamp, ^{slide} drive (M-106A) ^B does not operate when 'Fuel Present' condition imposed on Clamp Position No. 1. ³⁹² 5/26/92
- Clamp, ^{slide} drive (M-106A) ^B does not operate when 'Fuel Present' condition imposed on Clamp Position No. 2.
- Clamp, ^{slide} drive (M-106A) ^B operates on forward direction (EAST) when 'No Fuel Present' imposed on both the No. 1 and No. 2 clamp positions.

Test Conductor

J. S. Coleman

Date

5/26/92

QA

C. K. Claggett

Date

5/26/92

9. All test steps 1 thru 8 have been completed.

Test Conductor

J. S. Coleman

Date

5/26/92

TPCN 11
7/24/92

- 8.3.4.2 Verify the ^{upper end} ~~lower~~ ^{slide} clamp, drive (M-106B) ^A can be driven back (West) as follows: ³⁹² 5/27/92

1. Place the control system in 'HAND' mode of operation.
2. Drive the ^{upper} ~~lower~~ ^{slide} clamp (M-106B) ^A to its full forward position.
3. Impose the condition of 'Fuel Present' in clamp position No. 1 by temporarily forcing data register. ¹
4. Drive ^{upper} ~~lower~~ ^{slide} clamp (M-106B) ^A in back (West) direction.

Acceptance Criteria

- Clamp, ^{slide} drive (M-106B) ^A does not operate.

Test Conductor

J. S. Coleman

Date

5/26/92

QA

C. K. Claggett

Date

5/26/92

5. Impose the condition of 'No Fuel Present' in either clamp positions No. 1 and No. 2 by temporarily forcing data register. ¹
6. Drive ^{upper} ~~lower~~ ^{slide} clamp (M-106B) ^A in back (West) direction.

TPCN 11
7/24/92

Acceptance Criteria

TPCW 11
mm
7/24/92

- Clamp,^{slide} drive (M-106^A) operates in back direction.

786
5/26

Test Conductor

J. G. Coleman

Date

5/26/92

QA

C. R. Claysett

Date

5/26/92

7. Repeat steps 2 thru 6 above for clamp position No. 2.

Acceptance Criteria

TPCW 11
mm
7/24/92

- Clamp,^{slide} drive (M-106^A) does not operate when 'Fuel Present' condition imposed
- Clamp,^{slide} drive (M-106^A) operates when 'No Fuel Present' condition imposed.

786
5/26

Test Conductor

J. G. Coleman

Date

5/26/92

QA

C. R. Claysett

Date

5/26/92

8. Reverse upper clamp drive (M-106^A) direction and repeat steps 3 thru 7 above.

Acceptance Criteria

TPCW 11
mm
7/24/92

- Clamp,^{slide} drive (M-106^A) does not operate when 'Fuel Present' condition imposed on Clamp Position No. 1.
- Clamp,^{slide} drive (M-106^A) does not operate when 'Fuel Present' condition imposed on Clamp Position No. 2.
- Clamp,^{slide} drive (M-106^A) operates on forward direction (EAST) when 'No Fuel Present' imposed on both the No. 1 and No. 2 clamp positions.

Test Conductor

J. G. Coleman

Date

5/26/92

QA

C. R. Claysett

Date

5/26/92

9. All test steps 1 thru 8 have been completed.

Test Conductor

J. G. Coleman

Date

5/26/92

292
6/2/92 TPCN 11

8.3.4.3 Verify the lower ^{end} clamp drive ^{position "1"} (M-106C) can be driven back (West) as follows:

1. Place the control system in 'HAND' mode of operation.
2. Drive the clamp (M-106C) to its full close position.
3. Impose the following combination of conditions on the clamp drive by temporarily forcing data register and attempt to operate in the open direction.

1

Conditions

- A. No fuel present = /
- B. Extraction complete = /

NOTE: Zero (0) signifies condition not applied
One (1) signifies condition applied

Test	A	B	System Operates		Expected Result	
i	0	0	☒ yes	☒ no	no	
ii	0	1	☒ yes	☐ no	no YES	} RL #11 TCN 003 TPCN 003 TPCN 3
iii	1	0	☒ yes	☐ no	no YES	
iv	1	1	☒ yes	☐ no	yes	

Acceptance Criteria

- Clamp drive (M-106C) operates ~~only~~ when ^{either} ~~both~~ conditions ^{is} ~~are~~ met.

TPCN 3
TCN 003

Test Conductor Fred G. Coleman Date 5/27/92
QA C.R. Claggett Date 5/27/92

4. All test steps 1 thru 3 have been completed.

Test Conductor Fred G. Coleman Date 5/27/92

292
4/92 TPCN 11

8.3.4.4 Verify the lower ^{end} clamp drive ^{position "2"} (M-106D) can be driven back (West) as follows:

1. Place the control system in 'HAND' mode of operation.
2. Drive the clamp (M-106D) to its full close position.
3. Impose the following combination of conditions on the clamp drive by temporarily forcing data register and attempt to operate in the open direction.

1

Conditions

- A. No fuel present
- B. Extraction complete

NOTE: Zero (0) signifies condition not applied
One (1) signifies condition applied

Test	A	B	System Operates		Expected Result	
i	0	0	☒ yes	☒ no	no	
ii	0	1	☒ yes	☐ no	no YES	RL 11 TCN 003
iii	1	0	☒ yes	☐ no	no YES	TCN 003
iv	1	1	☒ yes	☐ no	yes	TPCN 3

Acceptance Criteria

- Clamp drive (M-106D) operates ~~only~~ when ^{either} ~~both~~ conditions ^{are} met. IS TCM 003

Test Conductor Fred G. Coleman Date 5/27/92
QA C.R. Claggett Date 5/27/92

4. All test steps 1 thru 3 have been completed.

Test Conductor Fred G. Coleman Date 5/27/92

8.3.4.5 Verify the ^{UPPER END} ~~lower~~ clamp drive ^{position "1"} (M-106E2) open interlock as follows: 392
5/27/92

- Place the control system in 'HAND' mode of operation.
- Drive clamp to full close position.
- Impose the following combination of condition on the clamp drive by temporarily forcing data register and attempt to operate in the open direction 1

Conditions

- A. No fuel present = 1
B. Extraction complete = 1

NOTE: Zero (0) signifies condition not applied
One (1) signifies condition applied

Test	A	B	System Operates		Expected Result	
i	0	0	☒ yes	☒ no	no	
ii	0	1	☒ yes	☐ no	no YES	TCN 003
iii	1	0	☒ yes	☐ no	no YES	TCN 003
iv	1	1	☒ yes	☐ no	yes	TPCN 003

Acceptance Criteria

- Clamp drive (M-106E2) operates ~~only~~ ^{either} when ~~both~~ conditions ^{TCN 003} are met.

Test Conductor Fred L. Coleman Date 5/27/92

QA C.R. Clayton Date 5/27/92

4. All test steps 1 thru 3 have been completed.

Test Conductor F.L. Coleman Date 5/27/92

8.3.4.6 Verify the ^{upper and} ~~lower~~ clamp drive ^{Position "2"} (M-106G2) open interlock as follows:

- Place the control system in 'HAND' mode of operation.
- Drive clamp to full close position.
- Impose the following combination of conditions on the clamp drive by temporarily forcing data register and attempt to operate in the open direction.

Conditions

- No fuel present = 1
- Extraction complete = 1

NOTE: Zero (0) signifies condition not applied
One (1) signifies condition applied

Test	A	B	System Operates		Expected Result
i	0	0	☒ yes	☒ no	no
ii	0	1	☒ yes	☐ no	no YES
iii	1	0	☒ yes	☐ no	no YES
iv	1	1	☒ yes	☐ no	yes

Acceptance Criteria

- Clamp drive (M-106G2) operates ~~only~~ ^{either} when ~~both~~ conditions ^{TCN 003} are met.

Test Conductor Fred L. Coleman Date 5/27/92

QA C.R. Clayton Date 5/27/92

4. All test steps 1 thru 3 have been completed.

Test Conductor F.L. Coleman Date 5/27/92

TPC 211
7/27/92

elevation

8.3.4.7 Verify the clamp table_{drive} (M-106I) up interlock as follows:

1. Place the control system in 'HAND' mode of operation.
2. Drive table top to full down position.
3. Impose the following combination of conditions on the table top drive by temporarily forcing data register and attempt to operate in the up direction

1

Conditions

- A. Pull Head A back
- B. Pull Head B back

NOTE: Zero (0) signifies condition not applied
One (1) signifies condition applied

Test	A	B	System Operates		Expected Result
i	0	0	—	yes	no
ii	0	1	—	yes	no
iii	1	0	—	yes	no
iv	1	1	✓	yes	yes

Acceptance Criteria

- Clamp_{drive} (M-106I) operates only when both conditions are met.

Test Conductor Frederic G. Coleman Date 5/27/92

QA C.R. Claggett Date 5/27/92

4. All test steps 1 thru 3 have been completed.

Test Conductor FS Coleman Date 5/27/92

8.3.4.8 Verify the clamp table_{drive} (M-106I) down interlock as follows:

1. Place the control system in 'HAND' mode of operation.
2. Drive table top to full up position.
3. Impose the following combination of conditions on the table top drive by temporarily forcing data register and attempt to operate in the down direction

1

Conditions

- A. Pull Head A back
- B. Pull Head B back

NOTE: Zero (0) signifies condition not applied
 One (1) signifies condition applied

Test	A	B	System Operates		Expected Result	
i	0	0	—	yes	✓	no
ii	0	1	—	yes	✓	no
iii	1	0	—	yes	✓	no
iv	1	1	✓	yes	—	yes

Acceptance Criteria

TPCN 11
 7/24/92

- Clamp^{table elevation} drive (M-106I) operates only when both conditions are met.

Test Conductor Fred G. Coleman Date 5/27/92

QA C.R. Claggett Date 5/27/92

4. All test steps 1 thru 3 have been completed.

Test Conductor Fred G. Coleman Date 5/27/92

8.3.5 Single Mode and Auto Mode Verification Test

8.3.5.1 Verify single mode of operation as follows:

- Place clamping table in 'single' mode of operation.

Acceptance Criteria

- Upper and lower clamps move into position to receive fuel.
- Upper and lower clamps move to open position
- Clamping table positioned at initial elevation

Test Conductor Fred G. Coleman Date 5/27/92

QA C.R. Claggett Date 5/27/92

- Simulate fuel placement on the clamping table in clamp positions No. 1 and No. 2 and place RBT in 'HOME' position.

Acceptance Criteria

- Signal received that fuel is in position and RBT is clear.

Test Conductor Fred G. Coleman Date 5/27/92

QA C.R. Claggett Date 5/27/92

3. Press 'Continue' until both the upper and lower clamps are closed in position No. 1 and No. 2.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

4. Simulate rod extraction operations by temporarily forcing the data register and press 'Continue' at control station. | 1

Acceptance Criteria

- Clamp table is indexed up one row.

Test Conductor Fred G. Coleman Date 5/27/92

QA C.R. Claggett Date 5/27/92

5. Repeat Step 4 above to simulate the extraction of all 17 rows of rods are indexed up into position for rod extraction.

Acceptance Criteria

- Clamp table is indexed up one row at a time.
- Upper and lower clamps move to open position after last row of rods extracted.
- Signal is generated to RBT to remove skeleton from Table after last row of rods is extracted.

Test Conductor Fred G. Coleman Date 5/27/92

QA C.R. Claggett Date 5/27/92

6. All test steps 1 thru 5 have been completed.

Test Conductor Fred G. Coleman Date 5/27/92

QA C.R. Claggett Date 5/27/92

8.3.5.2 Verify auto mode of operation as follows:

1. Place clamping table in 'Auto' mode of operation.

Acceptance Criteria

- Upper and lower clamps move into position to receive fuel assembly (if not already in position)
- Upper and lower clamps move to open position (if not already in open position).

Test Conductor Fred G. Coleman Date 5/28/92

QA C.R. Claggett Date 5/28/92

2. Simulate fuel placement on the clamping table in both clamp position No. 1 and No. 2 and clear RBT.

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

Acceptance Criteria

- Upper and lower clamp close on fuel assemblies.

Test Conductor Fred G. Coleman Date 5/28/92

QA C.R. Claggett Date 5/28/92

3. Simulate rod extraction operations for all 17 rows of rods.

Acceptance Criteria

- Clamp table is indexed up one row following extraction operations.
- After the 17th row of rods are extracted upper and lower clamps move to open position.
- Signal is generated to RBT to remove skeletons.

Test Conductor Fred G. Coleman Date 5/28/92

QA C.R. Claggett Date 5/28/92

4. All test steps 1 thru 3 have been completed.

8.3.6 Servo Drive Fault Test

1. Place the clamping table system in the 'Single' mode and initiate elevation drive (M-106I) to raise table.
2. During operation temporarily force the data register to impose an ~~torque~~ fault with the elevation drive (M-106I)

end-of-travel

Acceptance Criteria

- Motor stops when fault condition is implemented
- Alarm system is activated
- Alarm is silenced when acknowledged by operator
- Control system displays fault condition on control screen

Test Conductor Fred G. Coleman Date 5/29/92

QA C.R. Claggett Date 5/29/92

ø performs
sst for CCTV
no 7
vnc
7/31/92

CN # 4
vnc
7/31/92

1

3. Cause the system to print a report of fault condition

Acceptance Criteria

- A report is generated defining fault condition when commanded by operator

Test Conductor Fred G. Coleman Date 5/29/92
QA C.R. Claggett Date 5/29/92

4. Press 'Camera Call' on the control console and assess CCTV coverage by completing CCTV assessment form in Appendix E.

Acceptance Criteria

TRN 16
VFC
7/29/92

- Video images from cameras No. 3 and No. 7 are displayed on monitors
- Both cameras can be positioned to provide unobstructed view of the faulted drive system and then the drive systems.

RL #4
292 57

RL #1
RL #4
7X

Test Conductor Fred G. Coleman Date 5/29/92
QA C.R. Claggett Date 5/29/92

5. Correct fault condition and continue 'Single' mode operation

Acceptance Criteria

- The system can be recovered from fault condition and single mode operations continued.

Test Conductor Fred G. Coleman Date 5/29/92
QA C.R. Claggett Date 5/29/92

6. All steps 1 thru 5 have been completed.

Test Conductor F G Coleman Date 5/29/92

RL #1,
RL #4
792

9.0 POST PERFORMANCE REVIEW AND APPROVAL

The following signatures certify that the completed test, with all data collected, has been reviewed, and that the system has passed the requirements for system operational test. *Reference the exception/repair log entries: 9/11/92*

9/30/92
Test Engineer Date

10/6/92
Quality Assurance Date

10/6/92
Project Engineer Date

10/6/92
Test Director Date

10.0 RETENTION OF TEST RECORDS

The original working copy, including test exceptions and resolution and acceptance signatures, are to be maintained by the Test Director and stored at the NUS Gaithersburg building, Document Control Center. One copy of the original working document shall be sent to the DOE representative for their use and retention.

11.0 REFERENCES

- 11.1 NUS Drawings: 9315-M-2101
9315-M-2103
9315-M-2104
9315-M-2113
9315-M-2114
9315-M-2116
9315-M-2118
9315-M-2119
9315-M-2120
9315-S-1303
9315-S-2109
9315-M-0010
9315-M-0016
- 11.2 Specification 9315-TAC-202, System Operational Test Acceptance Criteria for the Fuel Handling Fixtures, latest revision.
- 11.3 Fuel Rod Consolidation Project Phase II Final Report, NUS Corporation, 12-21-87.
- 11.4 9315-M-200, Prototypical Spent Fuel Rod Consolidation Project Mechanical Systems and Equipment Technical Specification, December 27, 1989.
- 11.5 9315-TP-601, System Operational Test Procedure for Spent Fuel Rod Consolidation Prototype Control System, October 15, 1991, latest revision.
- 11.6 9315-P-120, Test Administration Manual for System Operational Test and Integrated Systems Tests, latest revision.

APPENDIX A
EQUIPMENT SETUP

A.0 DETAILED SETUP PROCEDURES

Note: In the following tests, table elevations are referred to the floor as elevation zero. For test purposes, a specific point (or points) should be established from which table elevations and levels may be measured. All operations to demonstrate parameters should be repeated a minimum of three (3) times.

A.1 Prepare the Axis (Drive Servo Control) for Operation

A.1.1 Clamping Table Elevation Drive

Verify that the Clamping Table Elevation Drive Motor (M-106I) is mechanically and electrically coupled after completion of the Control System SOT. Ensure that table is away from travel limits, since machine motion will occur in a following step.

A.1.2 Adjust the motor control parameters for (M-106I) per instructions from Modicon and record in the following Elevation Drive personality record form.

Axis personality record form:

Machine Name/Number: Clamping Table Elevation Drive

Axis Number: M-106I

Personality Variable	Projected Value	Final Value
Number of Motor Poles (NPOLES)	6	
Resolution (RES)	1000	
Rate Loop Proportional Gain (RPG)	40	
Rate Loop Integral Gain (RIG)	250	
Acceleration Time Constant (ATC)	98	
Following Error Limit (FE_LIM)	100000	
Peak Current Limit (IMAX)	100	
Average Current Trip Level (IAVG_LIM)	50	
CW End-of-Travel Limit (+EOT)	C	
CCW End-of-Travel Limit (-EOT)	0	
In-Position Tolerance Band (POS_TOL)	40	
In-Sync Tolerance Band (SYNC_TOL)	500	
Linear Acceleration (ACCEL)	20000	
Linear Deceleration (DECEL)	20000	
Position Cmd Time Constant (PCTC)	N/A	
Velocity Feed Forward (VFF) on/off	N/A	
Motor Base Speed (BASE_SPD)	3600	

- A.1.3 Record resolver counts/turn for the resolver GE-106I and enter into the Control System the maximum speed for JOG mode in resolver Counts/Sec. as noted below.

Resolver Number	JOG SPD (RPM)	Resolver Counts/Turn	Max JOG SPD Counts/Sec
GE-106I	996	1000	2000

16600

- A.1.4 Upper Proximity Switch ZE-106S

Select the "UP" motion and raise the top surface of the clamping table to the upper position stop, at an elevation of $54.880 \pm .100$ inches above the floor. Adjust the position of the proximity switch (ZE-106S) by physically moving the sensor to the upper limit position. JOG toward and away from the sensor to verify sensor position.

CAUTION: Observe carefully as the machine moves and be prepared to activate emergency stop if necessary.

- A.1.5 Using the surveyors level, measure the elevation of the four corners and the mid-point of each side of the table top. Verify that the table top is level within ± 0.06 inch of the true horizontal plane.

- A.1.6 Lower Proximity Switch, ZE-106R.

Repeat step A.1.4 at the "DOWN" mechanical stop by adjusting sensor ZE-106R at $43.260 \pm .100$ inch.

- A.1.7 Using the surveyors level, measure the elevation of the four corners and the mid-point of each side of the table top. Verify that the table top is level within ± 0.06 inch of the true horizontal plane.

- A.1.8 Create and verify an Axis Homing Sequence (AHS) for the Clamping Table Elevation Drive Motor (M-106I). (See "Start Program" in the Software Detail Design Document by Modicon). AHS parameters to be as given below. At completion of AHS, record "Home Offset" and "Final Home Position" in the chart below.

Motor Tag No: M-106I Home Direction: CCW
 Resolver Tag No: GE-106I Resolver Counts/Turn: 1000
 Home Speed: 1000 RPM 996 Counts/Sec. 16600
 Home Offset: 1000 resolver counts
 Final Home Position: _____

BER-01 - 5.30
 BER-01 - 5.29

43 5/8" sensor -
 to 43 3/4" after 3 min

Bracket is used
 to hold sensor tight by 1/4"

A.1.9 Return the AHS for the Clamping Table Elevation Drive Motor, M-106I, to "Home-As-Is".

A.1.10 In JOG mode, drive the lower clamp (M-106C) toward open, stopping when jaw separation is $10.42 \pm .03$ inches. Cause Control system to record this position value.

A.1.11 In JOG mode, drive the lower clamp (M-106C) toward close, stopping when jaw separation is $8.45 \pm .03$ inches. Cause Control System to record this position value.

A.1.12 Repeat A.1.10 and A.1.11 for other clamp (M-106D).

A.1.13 In JOG mode, drive lower clamp (M-106C) to open. Set up compression load cell fixture (9315-M-0012) to $8.45 \pm .03$ inches width and place between clamp jaws. Drive clamp to CLOSE and measure clamping force. If necessary, adjust current limiter to set $1900 \text{ lbs} < \text{clamping force} < 2,000 \text{ lbs}$.

CAUTION: Set current limiter initially to a low enough value to keep clamping force below 1900 lbs.

A.1.14 Repeat A.1.13 for other clamp (M-106D).

A.1.15 In JOG mode, operate the lower clamp slide (M-106B) to place saddle $1.00 \pm .03$ inch from west end of slide. Set limit switch to stop saddle at this position.

A.1.16 Repeat A.1.15 at east end of slide.

A.1.17 In JOG mode, move saddle (M-106B) to position clamp jaws as shown in the table below. Measurements shown are from the east edge of table. Cause control system to record these positions for the fuels indicated.

Westinghouse	17x17	152.7
✓ Westinghouse	15x15	153.7 $\pm .1$
✓ Combustion Engr.	16x16	158.8 $\pm .1$
✓ Combustion Engr.	14x14	147.5 $\pm .1$
B&W	15x15	147.5 $\pm .1$
		153.7 $\pm .1$

A.1.18 In JOG mode, drive upper clamp (M-106E2) toward OPEN, stopping when bottom surface of clamp bar (9315-M-2117, Item 7) is $10.72 \pm .03$ inches above fuel support (9315-M-2116, Item 2). Set limit switch at this position.

A.1.19 In JOG mode, drive upper clamp (M-106E2) toward CLOSE, stopping when clamp bar (9315-M-2117, Item 7) is $7.21 \pm .04$ inches above fuel support (9315-M-2116, Item 2). Set limit switch at this position.

M-106C
REW. CLOSE
6.923
7071 = 190
7070 = 115

has to be turned
id point.
7067
7067 = 040
55
722 = 47072 = 320

13
17
16
15

Pwr Lower Clamp

M-106 D	
O	C
12.060	8.434
10.048	8.451
10.076	8.453
10.051	8.453

M-106 C	
O	C
10.062	8.43
10.042	8.445
10.070	8.429

M-106 E2	
O	C
10.72	8.45
10.72	8.437
10.73	8.44

M-106 G2	
O	C
10.72	8.435
10.715	8.430
	8.432

W 15x15	W 17x17	BIW 15x15	CE 14x14
OPEN = 10.42 (± 0.3)	OPEN = 10.42 (± 0.1)	OPEN = 10.42 (± 0.3)	OPEN = 10.42 (± 0.5)
CLOSE = 8.39 (± 0.3)	CLOSE = 8.39 (± 0.3)	CLOSE = 8.50 (± 0.3)	CLOSE = 8.21 (± 0.3)

GE
pen =
loss = 5.19 (± 0.3)

- A.1.20 In JOG mode, drive upper clamp (M-106E2) to OPEN. Set up compression load cell fixture (9315-M-0012) to $8.45 \pm .03$ inches width and place it on fuel assembly support of clamp No. 1 to simulate a PWR fuel assembly. Drive the clamp to CLOSE and measure clamping force. Adjust actuator current limiter to set 180 lbs. < clamping force < 200 lbs.

CAUTION: Set current limiter initially to a low enough value to keep clamping load below 200 lbs.

- A.1.21 Repeat A.1.18 through A.1.20 for other clamp (M-106G2).
- A.1.22 In JOG mode, move clamp slide (M-106A) to position clamp bar (9315-M-2117, Item 7) in the positions shown in the table below. Measurements are taken from the east edge of table. Cause control system to record these positions for the fuels indicated.

Westinghouse	17x17	^{21.50} 21.36 $\pm .10$
Westinghouse	15x15	$19.46 \pm .10$
Combustion Engr.	16x16	$11.25 \pm .10$
Combustion Engr.	14x14	$17.25 \pm .10$
B&W	15x15	$22.18 \pm .10$

CAUTION: Ensure that M-106E3 and M-106G3 are in full UP positions before operating M-106A.

In JOG mode, drive the clamp saddle (M-106A) west until saddle is $1.00 \pm .03$ inches from end of slide. Set limit switch to this position.

- A.1.24 In JOG mode, drive the saddle east until the vertical rod support (9315-M-2120, Item 1) has rotated $90^\circ \pm 0.5^\circ$ to the east-west table axis. Record the position reading at which this event occurs.
- A.1.25 In JOG mode, drive the saddle east until it is $1.00 \pm .03$ inches from the east end of slide. Set limit switch to this position.
- A.1.26 Set up limit switch of vertical grid 1 & 2 (M-106E3) with saddle $1.00 \pm .03$ inches from top end of slide.

- 301
- A.1.27 With upper end clamp slide (M-106A) east of the position determined in 7.1.24, drive vertical grid 1 & 2 (M-106E3) down until the tips of the fuel guides (9315-M-2120, Item 4) extend into fuel support (9315-M-2122, Item 4). Set DOWN limit switch at this position.
- A.1.28 Repeat 7.1.27 for vertical grid 3 & 4 (M-106G3).
- A.1.29 In JOG mode, drive horizontal grid 1 & 2 (M-106F3) toward OUT until fuel guides (9315-M-2120, Item 4) are $90^\circ \pm 5^\circ$ to the rod guide support (9315-M-2120, Item 2). Set limit switch to this position.
- A.1.30 In JOG mode, drive horizontal grid 1 & 2 (M-106F3) toward IN until fuel guides (9315-M-2120, Item 4) have rotated $30^\circ \pm 5^\circ$ from the position of 7.1.29. Set limit switch for this position.
- A.1.31 Repeat 7.1.29 and 7.1.30 for horizontal grid 3 & 4 (M-106H3).

5.19 Signature _____

Date _____

5.19

M-106E3	
up/open	down/close
(11.293) 5.935	0 (5.378)
(11.265) 5.907	0 (5.362)
(11.275)	0 (5.335)

M-106G3	
up/down	down/close
11.358	5.450
11.398	5.430
	5.435

APPENDIX B
SAFETY PROCEDURES

SYSTEMS OPERATIONS TEST SAFETY CONSIDERATIONS

Performance of the SOTs in a manner which precludes the injury of personnel involved in the test performance or working in the Test Facility is of paramount importance. The following steps shall be taken to minimize the possibility of personnel being injured during the performance of SOTs:

1. Contraves and NUS will advise their employees and any subcontractors to stay clear of the Test Facility when tests are being conducted unless they are involved in the test performance or have another work assignment in the Test Facility.
2. Contraves will post a warning sign at the entrance to the Test Facility when testing is in progress advising personnel of the need to stay away unless involved in the testing or have some authorized work assignment in the area.
3. When feasible and deemed advisable by the Test Conductor the machine being tested will be surrounded by a portable barrier (ropes and posts) with a Caution Sign warning individuals to stay clear of the area unless authorized to enter by the Test Conductor.
4. When machines are being moved by installed motors the NUS electrical engineer operating the motor or the Test Conductor will be located in a position which permits him/her to observe the machine operation so that the equipment can be stopped if a dangerous situation appears to be developing. Such situations could involve unanticipated machine performance or personnel entering the test area and placing themselves in jeopardy.
5. When an SOT is in progress the Test Conductor will remain in the vicinity of the test so the all personnel involved in the test are under his observation and will perform any required test support activities directly under his supervision.
6. Only Contraves personnel who have been qualified to the DOE Hoisting and Rigging Manual Rev. 10-88 will operate the Test Facility overhead crane.
7. Only NUS test engineers will operate the Robotic Bridge Transporter (RBT), the Manipulator Transporter (MT), and the RM-10A Robot Arms.
8. Slings, hooks, and chains utilized with the Test Facility overhead crane or with the RBT will be those purchased specifically for use on the DOE project and have been certified to meet the requirements of ANSI B30.9.
9. The making of all electrical connections to the various equipment will be supervised by an NUS electrical engineer.

10. Protective headgear will be worn in the Test Facility when ever the Robotic Bridge Transporter (RBT) the Manipulator Transporter (MT) are being utilized or at any time the Test Conductor deems the use of protective head gear is appropriate.
11. The NUS Test Conductor is responsible to see that all the above safety requirements are implemented during the performance of the test for which he has responsibility.
12. The Test Conductor will verify that all test specific safety prerequisites identified in test procedures are satisfied and that any precautions identified in specific procedure steps as followed.
13. The NUS Test Director will perform frequent informal surveillance of the testing operations to verify the safety requirements are being adhered to by the personnel performing the test or other work in the test area.

APPENDIX C
PHOTO DOCUMENTATION REQUIREMENTS

Photo Documentation Requirements

Photographs are required to be taken of all System Operational Tests (SOTs). The following is a bulletized list which identifies when these photographs must be taken, as a minimum. Additional photographs may be taken at any other time during the test, as specified by the Test Conductor.

- Photographs must be taken of the initial setup for each test sequence.
- Photographs must be taken of the following critical interfaces between system, as a minimum,
 - Excell Crane/Downender (Loading of Fuel)
 - RBT/Fuel Assembly Storage Rack
 - RBT/Downender
 - RBT/Staging and Cutting Station
 - RBT/Clamping Table
 - FAHF/Mockup Fuel Assembly
 - Pull-Head Gripper/Fuel Rods
 - Rod Loader/Canister
 - NFBC Loader/Canister
 - RBT/Off-Normal Table
 - MT/Off-Normal Table
 - Fuel Canister/Storage Rack
 - NFBC Canister/Storage Rack
 - RBT/FAHF and RM-10A
 - Excell Crane/Fuel Canister Upender (Loading and Unloading)
 - Excell Crane/NFBC Canister Upender (Loading and Unloading)
 - MT/RM-10A
- Photographs must be taken of any equipment damaged during testing.
- Photographs must be taken of any damage to mockup fuel rods and/or mockup fuel assemblies.
- Photographs must be taken of the cutter to fuel assembly interfaces as follows:
 - In position prior to cut
 - During cutting operation
 - Cut area of end fitting after cut operation
 - Cut area of fuel assembly after cut operation
- Photographs must be taken of each "Hold Point".
- Photographs must be taken of the problem areas of any subsystem which does not perform its expected function.
- Photographs must be taken of any component, subsystem, or system, determined by the test conductor to be operating out of the normal/expected condition (i.e., excessive deflection, vibration, etc.).

**FUEL ROD CONSOLIDATION PROJECT
PHOTOGRAPHIC LOG**

TEST PROCEDURE No. 202

ENTRY NO.	FILM ROLL #	FRAME NO.	DATE/TIME	STEP NUMBER	EQUIPMENT/PURPOSE
1	10	20	5/21/92	8.3.1.2	upper shield Rear position
2	10	19	5/21/92	8.3.1.2	upper shield w 17x17 position
3	10	18	5/21/92	8.3.1.2	upper shield w 17x17 position
4	10	17	5/27/92	8.3.5.1	upper clamps closed, positions 1+2
5	10	16	5/27/92	8.3.5.1	lower clamps closed, positions 1+2
	10	15	-		
	10	14	5/28/92	8.3.5.2	raised Clamp Table
	10	13	5/28/92	8.3.5.2	lower clamps open, positions 1+2
	10	12	5/28/92	8.3.5.2	upper clamps open, positions 1+2
	10	11	6/1/92/1040	8.3.1.3	lower clamp, pos. #1, closed position
	10	⁷⁹² 10 9	6/2/92/1810	8.3.1.3	lower clamp, pos. #2, test fixture - side
	10	⁷⁹² 8 8	6/2/92/1810	8.3.1.3	" " " " - top view
		7	6/2/92/2030	8.3.1.5	upper clamp, pos. #1 closed
		6	6/3/93/1550	8.3.1.5.1	upper clamp, posit. #1, open
		5	6/3/93/1800	8.3.1.9.1	upper clamp, posit #2, test fixture, open
		4	6/4/91 1100	8.1.6.9	lower clamp pull test - twisting of fixture
		3	6/4/91 1445	8.1.6.9	pull test - disengagement
	H	#1	6/5/91 0745	8.1.3.1	photo of broken spacer on fuel ass'y.
		3,4	6/5/91 0900	8.1.3.2	photos of assemblies in Position 2
		5	6/5/91 1045	8.1.3.5	Table in full up position, ass'y in Position 2
		6	6/8/92 6:40	8.1.1.4	Table loaded with two B&W ass'y.

FUEL ROD CONSOLIDATION PROJECT
PHOTOGRAPHIC LOG

TEST PROCEDURE No. _____

[illegible]

FUEL ROD CONSOLIDATION PROJECT PHOTOGRAPHIC LOG

TEST PROCEDURE No. 202 TPCN 14

ENTRY NO.	FILM ROLL #	FRAME NO.	DATE/TIME	STEP NUMBER	EQUIPMENT/PURPOSE
12	25	25	5:00/6/8/92	8.3.3	Post gage & rods in clamp position NO. 2
12	25	24	6/8/92 5:25	8.3.3	Post gage with rod inserted into position NO. 9 in clamp position NO. 2
12	23	23	6/9/92 1900	8.1.6.4	Test gage setup. Table pull
12	22	22	6/9/92 1810	8.1.6.4	Push R.O. table measuring down
12	21	21	6/10/92	8.6.1.9	Overall test fixture
12	20	20	6/10/92	8.6.1.9	TEST GAUGE
TPCN 14					
15	8	8	8/11/92	8.1.3.3	PWR Clamping Tackle installed
	7	7		8.1.3.8	Lower Clamp Slide East
	6	6			Lower Clamp Slide West
	5	5		8.1.3.10	Upper Clamp Slide West
	4	4			East
	3	3		8.1.3.12	Lower Clamps Oper
	2	2			Lower Clamps Closed
	1	1		8.1.3.16	Table down
16	24	24	8/14/92	8.1.3.29	Lower ^{rod} Clamp Slide BACK
	23	23	8/14/92	8.1.3.26	Upper ^{rod} Clamp Slide BACK
	22	22	8/17/92	8.1.3.99	FAHF Clearance From Nucleon assembly
17	22	22	9/24/92	TPCN 24 8.1.3.165	Rod alignment test setup

Applicant

APPENDIX D**TEMPORARY PROCEDURE CHANGE NOTICE AND REPAIR LOG**

TEST PROCEDURE

9315-TP-202

REVISION

1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

TPCN #1

DATE

4/14/92

PROCEDURE NO.

9315 TP202

REV.

Rev 1

TITLE

CLAMPING TABLE

PROCEDURE SECTION(S)

ATTACHED

8.1.1, 8.1.2, 8.1.5, 8.1.7, 8.1.8, 8.1.9
8.2, 8.4 & 8.5

PROCEDURE CHANGE: (Use reverse side if necessary.)

DELETE THE FOLLOWING SECTIONS

8.1.1, 8.1.2, 8.1.5, 8.1.7, 8.1.8,
8.1.9, 8.2, 8.4, & 8.5.

(SEE ATTACHED SHEETS)

See also, Pages 22, 29, & 34.

Page 6 to 21, 30-31, 35-75, 105-159

Also, implement corrections necessary for the refocused phase III test program

- Revise 2.15, Page 3, to delete "and BWR" FWH. BWR assemblies will not be tested.
- Revise 3.2, Page 3, to read that the control system is programmed for W (7x17) fuel assemblies. BWR assemblies will be used for load testing only.
- Revise the second test objective, page 1, to read: "Demonstrate that the upper and lower clamping mechanisms function as designed under load for BWR fuel assemblies."

REASON FOR CHANGE:

SCOPE OF TESTING HAS BEEN REDUCED
DUE TO THE LIMITATIONS ON TEST HOURS
AVAILABLE TO RUN THE SOT TEST

CLASSIFICATION OF CHANGE

MINOR ☐ YES ☐ NO ☐

MAJOR ☒ YES ☐ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☒ YES ☐ NO

APPROVALS

<u>Daniel M. Chapin</u>	7/23/92	(1)(2)
TEST ENGINEER	DATE	
<u>A. M. M. M. M.</u>	10/6/92	(2)
QUALITY ASSURANCE	DATE	
<u>Frank M. M. M.</u>	10/6/92	(2)
PROJECT ENGINEER	DATE	
<u>Peter J. J. J.</u>	10/6/92	(2)
TEST DIRECTOR	DATE	

Notes:

- (1) Required for minor changes
- (2) Required for major changes

SOT PROCEDURE REVIEW TO REDUCE TESTS

Test Procedure No. 202 Rev. 1

Clamping Table

<u>Test Section</u>		<u>Reason</u>
No.	Description	
8.1.1	Drive System Operation Verified Test (No torque measurement)	TESTED IN 8.3.1
8.1.2	Verify Operation of Load Cells in Clamp positions 1 & 2	Done in Equipment Set Up will be checked in 8.1.3 and 601 test.
8.1.5	Verify Rod Extraction System Interface	Not required since the B&W 15x15 fuel type will not be processed during the Normal IST
8.1.7	Interlock Verification Test	Same as 8.1.5
8.1.8	Single Mode and Auto Mode Verification Test	Same as 8.1.5
8.1.9	Servo Drive Fault Test	Same as 8.1.5
8.2	System Verification for the W 15x15 Fuel Type	The W-15x15 fuel type will not be processed during the Normal IST
8.3.2	Verify operation of Load Cells	Load Cell operation will be checked in 601
8.4	System Verification for the CE 14x14 Fuel Type	The CE 14x14 Fuel Type will not be processed during the Normal IST
8.5.2	Verify Operation of Load Cells on BWR Table Top	Operation of Load Cells will be determined in 601

TEST PROCEDURE

9315-TP-202

REVISION

1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

2

DATE

5/21/92

PROCEDURE NO.

TP 202

REV.

1

TITLE

CLAMPING TABLE

PROCEDURE SECTION(S)

Multiple See Text

PROCEDURE CHANGE: (Use reverse side if necessary.)

DELETE SECTIONS AND REFERENCES
TO TORQUE TESTING

8.1.4.7, Page 27 & 28

8.1.4.8, Page 28

8.3.1.1, Page 76 to 80

REASON FOR CHANGE:

TORQUE TESTING HAS BEEN ELIMINATED
FROM TEST PROGRAM

CLASSIFICATION OF CHANGE

MINOR YES ☒ NO ☐

MAJOR YES ☒ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☒ YES ☐ NO

APPROVALS

See TAC Change Notice 004 for deletion
of acceptance criteria related to torque
mc 7/23/92

<u>EB Forrest</u>	<u>5/21/92</u>	(1)(2)
TEST ENGINEER	DATE	
<u>R. M. Mello</u>	<u>10/6/92</u>	(2)
QUALITY ASSURANCE	DATE	
<u>Frank M. Mello</u>	<u>10/6/92</u>	(2)
PROJECT ENGINEER	DATE	
<u>Pete V. John</u>	<u>10/6/92</u>	(2)
TEST DIRECTOR	DATE	

Notes:

- (1) Required for minor changes
- (2) Required for major changes

TEMPORARY PROCEDURE CHANGE NOTICE

~~2~~ 3
7/2

DATE 5/27/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.3.4.3.3, 8.3.4.4.3, 8.3.4.5.3, 8.3.4.6.3
Page 97 Page 98 Page 98 Page 99
Reference RLH 117/23/92

PROCEDURE CHANGE: (Use reverse side if necessary.)

Expected Results for Tests ii and iii for Clamp Drive Motors M106A, M106B, M106E2 and M106G2 ^{all} changed from "No, No" to "YES, YES"

Also, revise acceptance criteria to read "... operates when either condition is met." ^{if}

REASON FOR CHANGE:

Acceptance criteria of "A + B" should be "A or B" which change expected results, i.e. motor operation to "yes". See TCN 003.
↑ TAC CN 7/23/92

CLASSIFICATION OF CHANGE

MINOR YES ☒ NO ☐

MAJOR ☒ YES ☐ NO ☒ ^{7/22/92}

REVISION TO ORIGINAL PROCEDURE REQUIRED ☒ YES ☒ NO ^{7/22/92}

APPROVALS

7 G Coleman 5/27/92 (1)(2)
TEST ENGINEER DATE

A. J. J. J. J. 7/22/92 (2)
QUALITY ASSURANCE DATE

Frank G. Bullo 7/22/92 (2)
PROJECT ENGINEER DATE

[Signature] 7/22/92 (2)
TEST DIRECTOR DATE

- Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE

9315-TP-202

REVISION

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PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE # 4

DATE 5/28/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CAMPING TABLE

PROCEDURE SECTION(S) 8.3.6.2

PROCEDURE CHANGE: (Use reverse side if necessary.)

change type of fault required for Servo Drive Fault Test
from a torque fault to end of travel fault.

REASON FOR CHANGE: Difficulty in establishing a torque fault in 'Single' mode.
An end-of-travel fault will achieve objective of test.

This does not change acceptance criteria 5/28/92

CLASSIFICATION OF CHANGE

Type of fault is not specified in the TPC 5/28/92

MINOR ☒ YES ☒ NO ☐

MAJOR ☐ YES ☐ NO ☒

REVISION TO ORIGINAL PROCEDURE REQUIRED ☒ YES ☒ NO 1/1/92 7/22/92

APPROVALS

78 Coleman 5/28/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE

9315-TP-202

REVISION

1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE # 5

DATE 5/28/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.3.1.1

PROCEDURE CHANGE: (Use reverse side if necessary.)

Eliminate recording of calibrated instrument data for
measuring distance from top of table to reference surface.

Page 76, Step 8.3.1.1.3 ^{rev} 5/28/92

REASON FOR CHANGE:

New reference point measurement does not require
calibrated data

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☒ NO ☐

MAJOR ☐ YES ☐ NO ☒

REVISION TO ORIGINAL PROCEDURE REQUIRED ☒ YES ☒ NO

APPROVALS

J. L. Clewman 5/28/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE D2

TEMPORARY PROCEDURE CHANGE NOTICE #6

DATE 6/1/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.3.1.3.6 & 6.1.1.1
Page 24 & 19

PROCEDURE CHANGE: (Use reverse side if necessary.)

Delete drawing reference to compression load test fixture.
 "(DWC 9315-M-0016, Group 2)" 7/24/92

REASON FOR CHANGE: The use of a new compression gauge (Dillon Mechanical Force Gauge) requires a new load test fixture comprised of the gauge with metal blocks on either side to make up the required 8.42 ± 0.03 in. between clamp jaws.

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☒ NO ☐

MAJOR ☐ YES ☐ NO ☒

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☒ NO

APPROVALS

See also TACCNOC 7 For corresponding non-criteria change. 7/24/92

Fred S. Coleman 6/1/92 (1)(2)
 TEST ENGINEER DATE

 QUALITY ASSURANCE DATE (2)

 PROJECT ENGINEER DATE (2)

 TEST DIRECTOR DATE (2)

Notes: (1) Required for minor changes
 (2) Required for major changes

TEMPORARY PROCEDURE CHANGE NOTICE #7

DATE 6/5/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.1.3.1, 8.1.3.2, 8.1.3.7, 8.1.3.8 Page 22,23,25,26 ^{VVC} 7/24/92

Reference TAC CN 006 (VOIDED) ^{VVC} 7/24/92

PROCEDURE CHANGE: (Use reverse side if necessary.)

Transfer acceptance criteria for upper and lower alignment of clamps with fuel assembly and fittings to SOT-RBT.

Transfer acceptance criteria for upper and lower clamp contact with fuel assembly and fittings to SOT-RBT

REASON FOR CHANGE: Section 8.1.3 is a load test only. Did not align or clamp down on B+W 15x15 fuel which was used in this test because it is the heaviest. Alignment and clamping on W17x17 fuel will be transferred to RBT SOT.

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☒ NO ☐

MAJOR ☐ YES ☒ NO ☒

REVISION TO ORIGINAL PROCEDURE REQUIRED ☒ YES ☒ NO ⁷²

APPROVALS

SUPERCEDDED BY
TPCN #10
VNC Chapman
7/24/92

<u>Fred G. Coleman</u>	<u>6/5/92</u>	(1)(2)
TEST ENGINEER	DATE	
<hr/>	<hr/>	(2)
QUALITY ASSURANCE	DATE	
<hr/>	<hr/>	(2)
PROJECT ENGINEER	DATE	
<hr/>	<hr/>	(2)
TEST DIRECTOR	DATE	

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE # 008

DATE 6/5/92

RETEST ^{VAC}
7/24/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE Clamping Table

PROCEDURE SECTION(S) 8.3.3

PROCEDURE CHANGE: (Use reverse side if necessary.)

See attached pages

This TOCN for retest replaces Section 8.3.3. Delete the original section 8.3.3. ^{VAC}
7/24/92

REASON FOR CHANGE: To simplify the test performance by eliminating the need to make measurements for each row position by utilizing a fuel rod row alignment cage and three dummy test rods inserted into the Rod Extension Pill Head Grippers. The TAC requirement to have alignment within 10 mils is not changed.

CLASSIFICATION OF CHANGE

MINOR YES X NO

MAJOR X YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED X YES NO

APPROVALS

<u><i>Peter J. Hall</i></u>	<u>6/5/92</u> (1)(2)
TEST ENGINEER	DATE
<u><i>W. J. Williams</i></u>	<u>7/22/92</u> (2)
QUALITY ASSURANCE	DATE
<u><i>Frank J. Hall</i></u>	<u>7/22/92</u> (2)
PROJECT ENGINEER	DATE
<u><i>[Signature]</i></u>	<u>7/22/92</u> (2)
TEST DIRECTOR	DATE

- Notes: (1) Required for minor changes
(2) Required for major changes

8.3.3 Verify Rod Extraction System Interface.

The purpose of this test section is to verify that the established clamping table elevation positions for the Westinghouse 17 X 17 fuel assembly rod rows are properly aligned with the grippers on the Rod Extraction Pull Heads. The test will be conducted by installing a fuel rod row alignment gage (Figure 1) in the upper clamp position on the Clamping Table and verifying that three dummy fuel rods inserted in the middle and two outside grippers of a rod extraction pull head assembly can be inserted into the corresponding holes in the alignment gage. The ends of the fuel rods are 10 mils smaller than the holes in the alignment gage.

The test is performed as a Go-No Go type test. If the end of the dummy fuel rod does not enter the hole in the alignment gage the misalignment will be determined and evaluated. Some additional misalignment is possible due to the flared end of the gripper jaws and the fact that the upper end of the jaw will be in its open position prior to gripping a rod.

The test will initially be performed with the alignment gage in Upper Clamp Position No. 1 and then the gage will be moved to Upper Clamp Position No. 2.

Proceed as follows:

1. If the clamp table top is not in full down position reverse direction and drive table top down in HAND Mode until the drive motor automatically turns off.
2. Clamp the fuel rod row alignment gage for W 17 X 17 (See Figure 1) onto the top of the clamping table into the Upper Clamp No. 1. position.
3. Drive the northern most Rod Extraction Pull Head Drive Carriage in the western direction until it is accessible from the west end of the Rod Consolidation Table. The middle dummy fuel rod should be approximately 1/2 inch further west than the two rods in the end grippers.
4. Drive the Upper Clamp to its eastern most position. Insert the three dummy fuel rods into the Rod Extraction Pullhead mounted in the northern most carriage in the middle gripper (use long rod) and the two end grippers (two shorter rods). The inserting depth into the grippers should be 2 inches.

5. Make final runs moving the Rod Extraction pull head in the west direction until the following conditions can be achieved:
 - a) The three dummy rods can be inserted into the two end holes and the middle hole in the top row of the fuel rod row alignment gage.
 - b) Adjust the length of the dummy fuel rods by cutting or inserting the dummy fuel rods further into the grippers such that the length of the dummy rod is as short as possible and still able to pass through the holes in the fuel rod row alignment gage that are shown as Figure 1 without hitting the protruding pins in the gage.

Note: The positions of the fuel rod row alignment gage in the Upper Clamp Assembly may need to be adjusted using shims and a level gage to get the initial set up.

6. Drive the Pull Head Carriage to the retract position in the Jog Mode as necessary to withdraw the dummy fuel rods from the alignment gage.
7. Drive the Clamp Table top up until it automatically turns off.
8. Drive the Pull Head in the extend position (West) using the Jog Mode and in small increments to determine if the dummy fuel rods will enter the three holes in the top row of the fuel rod alignment gage. Continue the rod extraction pull head movement until the three rods are in the three holes.

(Note the center rod is 0.5 inches longer than the two side rods). Stop when the side rods start to move out of the west side of the gage.

If there is an interference between the end of the dummy fuel rod and the hole in alignment gage, it should be measured and recorded for evaluation.

Record interferences on the Log Sheet.

***TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

Type of Measuring Device N/A Range N/A
Identification No. N/A Calibration Due Date N/A

DATA LOG - CLAMP POSITION No. 1

Fuel Rod Row Alignment Gage Position

FRANK TO
ENTER DATA
IN INK.
2 pages

South		Middle		North	
Rod Enters Yes/No	Measured offset	Rod Enters Yes/No	Measured offset	Rod Enters Yes/No	Measured offset
1. yes	N/A	yes	N/A	yes	N/A
2. yes		yes		yes	
3. N/A		yes		N/A	
4. N/A		yes		N/A	
5. N/A		yes		N/A	
6. N/A		yes		N/A	
7. N/A		yes		N/A	
8. N/A		yes		N/A	
9. N/A		yes		N/A	
10. N/A		yes		N/A	
11. N/A		yes		N/A	
12. N/A		yes		N/A	
13. N/A		yes		N/A	
14. N/A		yes		N/A	
15. N/A		yes		N/A	
16. yes	N/A	yes	N/A	yes	N/A
17. yes		yes		yes	

9. Repeat Step 6
10. Index Clamp Table up one row by pressing "Continue" on the Control Console and repeat steps 8 and 9.
11. Repeat step 10 above by pressing "Continue" between consecutive operations until all 17 rows of rods have been measured.

NOTE

Photographs need not be taken of all rows. Photographs must be taken of the center row and last row as a minimum.

Acceptance Criteria

The dummy fuel rod(s) were able to be inserted into the appropriate holes in the Fuel Rod Row Alignment Gage.

Test Conductor F. B. Gallo Date 6/8/92

QA L. Mulgrew for R.C. Date 7/22/92

12. Repeat steps 1 through 10 with the Fuel Rod Row Alignment Gage installed in Clamp Position No. 2

DATA LOG - CLAMP POSITION No. 2

Fuel Rod Row Alignment Gage Position

South		Middle		North	
Rod	Measured	Rod	Measured	Rod	Measured
Enters	offset	Enters	offset	Enters	offset
Yes/No		Yes/No		Yes/No	
1. yes	N/A	yes	N/A	yes	photo taken
2. yes		yes		yes	
3. N/A		yes		N/A	
4. N/A		yes		N/A	
5. N/A		yes		N/A	
6. N/A		yes		N/A	
7. N/A		yes		N/A	
8. N/A		yes		N/A	
9. N/A		yes		N/A	photo taken
10. N/A		yes		N/A	
11. N/A		yes		N/A	
12. N/A		yes		N/A	
13. N/A		yes		N/A	
14. N/A		yes		N/A	
15. N/A		yes		yes	
16. yes		yes		yes	N/A
17. yes	N/A	yes	N/A		

Acceptance Criteria

The dummy fuel rod(s) were able to be inserted into the appropriate holes in the Fuel Rod Row Alignment Gage.

Test Conductor F. M. Gallo Date 6/8/92

QA U. M. Gallo for R.C. Date 7/22/92

13. All test steps 1. through 12 have been completed.

Test Conductor F. M. Gallo Date 6/8/92

FIGURE 1 Continued

	1	PLATE	1	AL	
A	2	PIN	81	ST	

NOTE :

- A) Pins can be fabricated from Standard hex head or socket head bolts. ANY Steel Material (Stainless or Carbon steel) can be used
- 1) MATERIAL Certification are not required
- 2) when used as a fuel rod alignment gage the pins are removed from the circled holes.

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

~~004~~ ^{6/14/92} 7/22/92 #9

DATE 6/10/92

PROCEDURE NO. 9315 TP 202 REV. 1 TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.1.6

PROCEDURE CHANGE: (Use reverse side if necessary.)

See attached sheets (3 pages)
See specific revisions on page 5 m 7/13/92

REASON FOR CHANGE:

Correct procedure and incorporate new test fixture

CLASSIFICATION OF CHANGE

TAC CN OCT 7 revises acceptance criteria.
Also reference TAC CN 5
7/13/92

MINOR YES 1 NO

MAJOR YES ✓ ^{7/13/92} NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES 1 NO

APPROVALS

7/12/92 *EB Farnest* 6/10/92 (1)(2)
TEST ENGINEER DATE
A. M. M. M. 10/6/92 (2)
QUALITY ASSURANCE DATE
J. M. M. M. 10/10/92 (2)
PROJECT ENGINEER DATE
Peter V. M. M. 10/6/92 (2)
TEST DIRECTOR DATE

- Notes: (1) Required for minor changes
(2) Required for major changes

TACN
CLAMPING TABLE
SOT 202

TACN 9
Page 2 of 5
JUN 7 13 01 92

1.1.6.1 Clamping table will be
in full up position

Reason: This will provide better
alignment of pull head and test
fixture for the pull head test.
It is also more secure in that
table is higher from base support.

1.1.6.5 Only one pull head will
be used in test

Reason: One pull head is sufficient
to achieve required force.

1.1.6.6 Distance to consolidation table
will be measured at each corner
of ~~the~~ east edge of the clamping
table

Reason: Force is applied with one pull assembly
position instead of center of table
this will show if there is any rotational
(twist) in table under load as well
as linear movement to the east.

3.1.6.7 Test force will be 2600 ± 50 lbs

Reason: TAC section 19.1 specifies
 2600 ± 50 lbs as the pull force.

3.1.6.9 Test fixture will be the
the tube steel ~~mock~~ mock
assembly which will allow
both upper and lower clamps
to be used. Both upper and lower
PWR clamps can be repositioned
as needed to allow use of assembly

Reason: Tube steel mock assembly
~~more closely models the~~
~~actual clamping arrangement.~~

8.1.6.13 Cable hoist + puller will not
be used. Force will
be applied by pull head
carriage. Force will be
1300 lbf.

Reason: Pull head carriage is sufficient
to obtain pull force. TAC
change notice has been
issued to change the force
to 1300 lbf.

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

"Revision Sheet"

DATE 7/30/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) 8.1.6 Page 32-34

PROCEDURE CHANGE: (Use reverse side if necessary.)

- Revise step 8.1.6.1 to read: "Place the clamping table in the Full UP position."
- Revise step 8.1.6.5 to read: "Connect the test fixture to ~~one~~ ^{one} pull head carriage. ^{7/24/92} Either pull head is acceptable."
- Revise step 8.1.6.6 to read: "Measure and record the distances between the east edge of the clamping table top's North and South ends and the west face of the consolidation table as a reference."
- Revise step 8.1.6.7 to read: "Slowly drive the pull head carriage until the load cell in the load fixture measures $2600 \pm 250 / - 50$ lbs. Remeasure the distance (refer to step 6 above) between the tables."
- Delete the note following step 8.1.6.7
- Revise step 8.1.6.9 to read: "Insert tube steel mock-up fuel assembly test fixture into position 1."
- Revise step 8.1.6.13 to read: "Apply an extraction force of 1300 ± 100 lbs."

Implemented the above revisions in the text.

Virgil M. Chapman TAC

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 7/31/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) 8.1.3, 8.1.4, 8.3.1.1, 8.3.1.4, 8.3.2, 8.3.6

PROCEDURE CHANGE: (Use reverse side if necessary.)

This procedure change specifies testing necessary to complete certain sections of 9315-TP-202, Revision 1. See Pages 2-4 for explanations. See Pages 5 to 51 for the test steps. This TPCN incorporates previous TPCNs as applicable to complete the testing.

REASON FOR CHANGE:

Previous testing was not completed. Methodology is revised to demonstrate criteria not adequately demonstrated in the initial testing. Reference TPCN 207 for revised acceptance criteria, some of which are demonstrated by this test.

CLASSIFICATION OF CHANGE

MINOR ☐ YES ☐ NO ☐

MAJOR ☐ YES ☒ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

<u>Unil M Phapma</u>	<u>7/31/92</u>	(1)(2)
TEST ENGINEER	DATE	
<u>Robert J. Hill</u>	<u>7/31/92</u>	(2)
QUALITY ASSURANCE	DATE	
<u>Frank M. Mallo</u>	<u>7/31/92</u>	(2)
PROJECT ENGINEER	DATE	
<u>Frank M. Mallo</u>	<u>7/31/92</u>	(2)
TEST DIRECTOR	DATE	

- Notes: (1) Required for minor changes
(2) Required for major changes

This retest procedure seeks to clarify and resolve issues developed during initial SOT testing of the Clamping Table. It also seeks to demonstrate certain acceptance criteria which were not demonstrated in the initial testing. TAC Change Notice No. 007 revises test acceptance criteria and should be considered in review of this retest TPCN.

- . Certain Daily Test Log entries identify issues which need to be closed. Specifically, entries related to the lower clamp slide positioning need resolution.
- . Certain testing was erroneously deleted from this test procedure. It was to be transferred to the RBT SOT since concurrent RBT testing was required in Clamping Table demonstrations. This testing is re-instated in this test procedure by this TPCN. RBT testing as per it's SOT is not revised for Clamping Table demonstrations.

This testing will demonstrate the placement of Westinghouse 17 X 17 fuel assemblies on the Clamping Table using the RBT with PWR FAHF attached to demonstrate functional criteria.

- . The previous use of the heavier B&W 15 X 15 assemblies was required for load testing. B&W 15 X 15 assemblies will not be used for functional testing. However, previous load deflection testing in Section 8.3.1.1 and 8.1.4 produced data which indicates that the Clamping Table raises under application of load. The comparison of 12 sets of measurements produced one load deflection, two identical values, and nine elevation increases under loaded conditions. This data is contra-intuitive and this load testing shall be repeated in part using the B&W 15 X 15 assemblies.

The probable cause for the unexpected deflection measurements may be changes in the process control system which occurred between the unloaded and loaded tests.

The Clamping Table elevations will be recorded before and after placement of two B&W 15 X 15 assemblies on the table top. This is to demonstrate that the Clamping Table does not deflect more than 0.06 inches under load. The corner measurements at each retested elevation will be averaged to provide an estimate of table top center deflection as required by the TAC.

- . The previous data related to level measurements (measurements at four corners does not differ by ± 0.09 inches for variations in load and elevation) produced data which generally support the criteria. However, some data is not within the required range. Two sets of original data indicate maximum deviations in excess of 0.09 inches. One deviation is 0.217 inches, two other deviations are less. Since these deviations only occurred at the same point in the testing sequence, these variations may be suggestive of human error. However, subsequent retesting also produced one set of data with a deviation in excess of the range and at a comparable measurement point.

This testing is repeated in part with B&W 15 X 15 mock-up fuel assemblies to resolve the discrepant readings obtained in previous testing.

- . Retesting at each of the 17 W 17 X 17 rod row elevations is not performed in the load testing with the mock-up B&W 15 X 15 fuel assemblies.
- . Previous testing involving Clamping Table elevations provided variations in elevation data that is assumed to be largely the result of measurement inaccuracy. The installation of the Clamping Table does not provide for ease of measurement. Previous testing was performed with clamped-on reference lines. Slight variations in the location of repeated measurements are assumed to provide slight variations in the observed measurement.

However, the variations may also be attributed to poor repeatability at setpoint. This testing seeks to obtain data suitable for the evaluation of repeatability using the process control system indications and measurements to the floor using a tape measure rather than mechanical measurements from an arbitrary field-installed reference line. If required, level measurements will be normalized to eliminate any constant elevation variable.

- . This re-testing also includes some additional functional verifications related to fuel assembly placement which was not included in the original testing. Since the Downender establishes the initial positioning of the fuel assemblies through the process, this testing will start with the W 17 X 17 fuel assemblies on the Downender's bottom support raised to the fuel-specific setpoint. Fuel will be transferred from the Downender to the Clamping Table using the RBT operating in the Hand mode.

- . This testing involves the use of fuel assemblies from which the end-fittings have not been removed. The presence of these end fittings will cause interference at the Extraction Table end of the Clamping Table. Upon lowering fuel to position, RBT operations will be switched to the JOG mode to implement the required off-set for clearance. This off-set will be measured and this measurement will then be used in evaluation of assembly positioning on the table and clamp alignment verifications.

The clamps will not be closed if alignment with the lower end fitting and upper grid is not physically obtained due to this off-set. This testing will then be performed using a test fixture with W 17 X 17 cross-sectional dimensions.

- . This retest TPCN supersedes Section 8.3.2 and incorporates acceptance criteria related to load cell actuation. Delete Section 8.3.2 and void TPCN 13 (previously prepared but not tested.)
- . This retest TPCN supersedes section 8.3.1.4 which sought to test lower clamp slide travel. This section was previously initiated in the HAND mode but not completed. The exceptions observed were not previously resolved and testing was not completed. This retest will be performed in the JOG mode to measure lower clamp slide travel and verify that hard stop contact is not made at ends of travel.

Additionally, this testing will verify similar conditions for the other Clamping Table drives. Should the data provide verification of previously revised acceptance criteria, then the test report will address the observations.

- . This retest will close Exception/Repair Log RL #1 which observed that CCTV Camera 7 was not installed. This retest supersedes Section 8.3.6 for the retest.
- . This retest will also collect data required to close a DOE comment related to the IST and to close open items in the operating procedures.

[illegible]

NOTE

Homing of a system may slightly alter position indications in reference to an absolute value. It is not known whether this effect would be measurable within the accuracy limits imposed for testing. If subsequent re-homing is required in the performance of this retest, then ensure that absolute measurements with 1/16th inch accuracy are made before and after the homing sequence. These measurements should be recorded and discussed in the test log.

#19 8.1.3.6 Ensure that the Downender, RBT, and Clamping Table are homed.

8.1.3.7 Place the Clamping Table in the JOG Mode.

NOTE

Operate each item of Clamping Table equipment in the JOG Mode between the ends-of-travel recording total travel distance and distance from hard stops with a caliper if the dimension is in the calibrated range or with a tape measure if dimensions exceed the caliper's calibrated range.

Clamping Table Elevation M106I homed at 46'17/32" as measured from the SW corner tube to top to floor. No internal measurable distance was available ^{11/19/92}

Downender Bottom support M103B homed at 5.881" as measured from the bottom of the bottom support plate to the frame below after resolution of homing problems. ^{11/19/92}

Lower Clamp Slide M-106B Jog Mode Operations

- 8.1.3.8 Operate Lower Clamp Slide M-106B between the East and West ends-of-travel in the JOG Mode measuring total travel distance and the distance from hard stops at each end of travel. Record PWR Clamping Table position indications.

PHOTO 6

West End of Travel Indication: 156.614" at HstopRL #21 * West Distance from Hard Stop: 0"East End of Travel Indication: 140.812" at Hstop

PHOTO 7

RL #21 * East Distance from Hard Stop: ~ 3/8"RL #22
RL #22 Total Travel Distance: 15 5/8" **

** Tape measure from East hard stop to East side of slide

*

Type of Measuring Device: Caliper

Range: 12"

FOWLER

Identification No: 52-008-012 Calibration Date: 5/26/928.1.3.9 Acceptance Criteria

- Lower Clamp Slide M-106B travels 14 to 16 inches between ends of travel.

RL #21.

Lower Clamp Slide M-106B does not contact hard stops at either end of travel.

David M. Chapman 8/11/92
Test Conductor Date
[Signature] 8/11/92
QA Date

Upper Clamp Slide M-106A Jog Mode Operations

- 8.1.3.10 Operate Upper Clamp Slide M-106A between the East and West ends-of-travel in the JOG Mode measuring total travel distance and the distance from hard stops at each end of travel. Record PWR Clamping Table position indications.

PHOTO 5

West End of Travel Indication: 26.564" at H Stop

RL#21

* West Distance from Hard Stop: 0.730" at tongue fault

PHOTO 4

East End of Travel Indication: 6.949" at H Stop

RL#21

* East Distance from Hard Stop: 0"

Total Travel Distance:

19 9/32" **

** measured from East hard stop to east of slide when West.

*

Type of Measuring Device: Caliper

Range: 12"

Fowler

Identification No: 52008-012 Calibration Date: 5/26/928.1.3.11 Acceptance Criteria

RL#24

Upper Clamp Slide M-106A travels 14 to 18.5 inches between ends of travel.

RL#21

Upper Clamp Slide M-106A does not contact hard stops at either end of travel.

David M. Phares
Test Conductor

8/11/92

Date

D. Mulgrew
QA

8/11/92

Date

6 of 7

Lower Clamp 1 M-106C Jog Mode Operations

- 8.1.3.12 Operate Lower Clamp 1 M-106C open and closed recording clamp open dimensions and position indications at each end of travel.

PHOTO 3

* OPEN Dimension:

10.256"

OPEN Indication:

10.229" Hstep

PHOTO 4

* CLOSE Dimension:

6.941"

CLOSE Indication:

6.970 Hstep

*

Type of Measuring Device: Caliper

Range: 12"Identification No: ^{Fowler}52-008-012Calibration Date: 5/26/92Lower Clamp 2 M-106D Jog Mode Operations

- 8.1.3.13 Operate Lower Clamp 2 M-106D open and closed recording clamp open dimensions and position indications at each end of travel.

PHOTO 3

* OPEN Dimension:

10.323"

OPEN Indication:

10.343" Hstep

PHOTO 4

* CLOSE Dimension:

6.927"

CLOSE Indication:

6.694" Hstep

*

Type of Measuring Device: Caliper

Range: 12"Identification No: ^{Fowler}52-008-012Calibration Date: 5/26/92

Upper Clamp Jog Mode Testing**NOTE**

Use the Emergency Stop feature or other methods as required to obtain the upper clamp swing point dimension. The upper clamp opens by raising the clamp bar clear of the fuel assembly and then swinging the clamp bar away from the fuel assembly. The swing point dimension is expected to be greater than 8.536 inches which is the height of a B&W 15 X 15 fuel assembly. Repeated testing may be performed to obtain a reliable dimension.

Upper Clamp 1 M-106E2 Jog Mode Operations

- 8.1.3.14 Operate Upper Clamp 1 M-106E2 open and closed recording clamp closed ~~indication~~ and dimension, clamp swing point dimension, and clamp open position indication. Observe that the clamp bar opens (E/W) to contact the open stop to clear the space allocated for assembly removal and loading. Observe that the clamp bar rotates to a N/S orientation in closure. ^{TPCN 25 9/29/92}

*Swing Point Dimension: 8.8-15" 8.908" ^{circled}

OPEN Indication: 10.452" "off", Hand made

*CLOSE Dimension: 6.256"

~~CLOSE Indication:~~

*

Type of Measuring Device: Caliper Range: 12"

Fowler

Identification No: 52-008-012 Calibration Date: 5/26/92

Upper Clamp 2 M-106G2 Jog Mode Operations

8.1.3.15 Operate Upper Clamp 2 M-106G2 open and closed recording clamp closed ~~indication~~ and dimension, clamp swing point dimension, and clamp open position indication. Observe that the clamp bar opens (E/W) to contact the open stop to clear the space allocated for assembly removal and loading. Observe that the clamp bar rotates to a N/S orientation in closure.*

* Swing Point Dimension: 2.823"

OPEN Indication: 10.573", Open Highlighted

* CLOSE Dimension: 6.218"

~~CLOSE Indication:~~ _____

TPCN 25
4/24/92

*
Type of Measuring Device: Caliper Range: 12"
Identification No: 52-008-012 Calibration Date: 5/21/92

Table Elevation M-106I Jog Mode Operations

- 8.1.3.16 Operate Table Elevation M-106I between the upper and lower ends of travel. Record elevation from floor at each corner at each end of travel. Record distance from hard stop at each end of travel. Record position indications at each end of travel. Calculate the total travel distance as an average of the four-corner measurements.

UP Elevation from Floor: N/E: 58 7/32N/W: 58 3/8S/E: 58 1/4S/W: 58 1/2 AVE = 58.336RL#20 * UP Distance from Hard Stop: N/AUP Position Indication: 11.692" CW FOT LimitDOWN Elev. from Floor: N/E: 46 1/4

Note: time to lower was 128.70 seconds

N/W: 46 1/2S/E: 46 5/16S/W: 46 1/2 AVE = 46.391p4001 RL#28 * DOWN Distance from Hard Stop: ~ 1/8" tape measure, exposed threadDOWN Position Indication: 0.016" CCW FOT LimitRL#27 Total Travel Distance: 11.95"

* Type of Measuring Device: Caliper		Range: <u>12"</u>
Identification No: <u>52-008-012</u>		Calibration Date: <u>5/16/92</u>

8.1.3.17 Acceptance Criteria

RL#20 . Table Elevation M-106I does not contact hard stops
RL#28 at either end of travel.

RL#27 . Vertical motion covers a range of 11.62 ± 0.15 inches.

David M. Chapman 8/11/92
Test Conductor Date
[Signature] 8/11/92
QA Date

Reset table TOG Mode
11.638 inches in 13.011 sec
~534ipm

8.1.3.18 Place each drive in a mid-point position.

8.1.3.19 Perform the Restore Process for the Clamping Table. With no fuel and the process control system's sequence reset, the Clamping Table initializes to a receive fuel configuration.

8.1.3.20 Observe that the Clamping Table restores with

- . Table Elevation M-106I UP
- . Lower Clamp Slide M-106B FWD
- . Upper Clamp Slide M-106A FWD
- . Lower Clamp 1 M-106C OPEN
- . Lower Clamp 2 M-106D OPEN
- . Upper Clamp 1 M-106E2 OPEN
- . Upper Clamp 2 M-106G2 OPEN

8.1.3.21 Place the Clamping Table in the HAND Mode.

Total Rows 17
Current Row 8

8.1.3.22 Record the position indications for

Lower Clamp 1 M-106C: 10.229

Lower Clamp 2 M-106D: 10.323

Upper Clamp 1 M-106E2: 10.511

Upper Clamp 2 M-106G2: 10.503

Upper Clamp Slide M-106A: 21.153

Lower Clamp Slide M-106B: 152.204

Table Elevation M-106I: 11.512

8.1.3.23 Record the distance from the BACK hard stops for

RL#33 *Upper Clamp Slide M-106A: 5 7/8" Tape measure

RL#33 *Lower Clamp Slide M-106B: 4 3/16" Tape measure

*

Type of Measuring Device: Caliper	Range: _____
Identification No: _____	Calibration Date: _____

Upper Clamp Slide M-106A to BACK

NOTE

The Upper Clamp Slide M-106A is not to operate closer than 1 inch from the hard stop in programmed operations.

8.1.3.24 Place Upper Clamp Slide M-106A in the BACK position in the HAND Mode.

8.1.3.25 Record the position indication, the travel distance, and the measured distance from the hard stop for Upper Clamp Slide M-106A.

Position Indication: 26.113 in. "BACK" highlighted

Travel Distance: 4 3/4" (in 29.17 seconds)

RL#33

*Distance from Hard Stop: 1 1/8" tape measure

*

Type of Measuring Device: Caliper Range: _____

Identification No: _____ Calibration Date: _____

8.1.3.26 Acceptance Criteria

The Upper Clamp Slide M-106A is ≥ 1.00 inches from the hard stop in the BACK position.

David M. Chapman
Test Conductor

8/14/92

Date

Thomas M. Kelly
QA

8/19/92
Date

Roll 16
Photo 23

Lower Clamp Slide M-106B to BACK

NOTE

The Lower Clamp Slide M-106B is not to operate closer than 1 inch from the hard stop in programmed operations.

8.1.3.27 Place Lower Clamp Slide M-106B in the BACK position in the HAND Mode.

8.1.3.28 Record the position indication, the travel distance, and the measured distance from the hard stop for Lower Clamp Slide M-106B.

Position Indication:

155.997 in
~~156.053 in~~ "BACK" highlighted

Travel Distance:

3.080" (caliper) (in 31⁸⁰ seconds)

RI #33 *Distance from Hard Stop:

1 9/16" 1" on rest
RI #32

*

Type of Measuring Device: Caliper Range: _____

Identification No: _____ Calibration Date: _____

8.1.3.29 Acceptance Criteria

- . The Lower Clamp Slide M-106B is $\geq$ 1.00 inches from the hard stop in the BACK position.

David M. [Signature]
Test Conductor

2/14/92
Date

[Signature]
QA

2/14/92
Date

Roll 116 photo 24

NOTE

The following load testing with B&W 15 X 15 fuel assemblies must be performed without any interruption which changes the state of the Process Control System's position indication for the Clamping Table elevation.

NOTE

The Clamping Table has been verified to be level (bubble is in center) E/W and N/S using a carpenter's level.

First Repeatability Test

8.1.3.30 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable) 0.1070 ^{W 8/11/92}
N/E Corner:	<u>58</u>	<u>58.0</u>	<u>58.1233</u>
N/W Corner:	<u>58 1/4</u>	<u>58.25</u>	<u>58.1728</u>
S/E Corner:	<u>58 1/4</u>	<u>58.0625</u>	<u>58.1233</u>
S/E ^{W 8/11/92} Corner:	<u>58 1/4</u>	<u>58.25</u>	<u>58.143</u>

8.1.3.31 Note the position indication for Table Elevation M-106I.

11.606

8.1.3.32 Operating the Clamping Table in the HAND mode, lower the Table Elevation M-106I to the DOWN position.

21# 38 Lower DOWN indication did not illuminate.

8.1.3.33 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>49 11/16</u>	<u>49.6875</u>	<u>49.8108</u>
N/W Corner:	<u>49 7/8</u>	<u>49.875</u>	<u>49.7478</u>
S/E Corner:	<u>49 3/4</u>	<u>49.75</u>	<u>49.8108</u>
S/E ^{W 8/11/92} Corner:	<u>49 7/8</u>	<u>49.875</u>	<u>49.768</u>

8.1.3.34 Note the position indication for Table Elevation M-106I.

3.306

8.1.3.35 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the eighth W 17 X 17 rod row elevation.

8.1.3.36 Note the Clamping Table elevations from the floor at each corner using a tape measure.

5 control
to index
21.94 seconds

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>53 5/32</u>	<u>53.15625</u>	<u>53.2795</u>
N/W Corner:	<u>53 11/32</u>	<u>53.34375</u>	<u>53.34375</u> ²⁶⁶⁶
S/E Corner:	<u>53 7/16</u>	<u>53.1875</u>	<u>53.2483</u>
^{W 17 X 17} S/E Corner:	<u>53 3/8</u>	<u>53.375</u>	<u>53.268</u>

8.1.3.37 Note the position indication for Table Elevation M-106I.

6.722

8.1.3.38 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the seventeenth W 17 X 17 rod row elevation.

8.1.3.39 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>57 5/8</u>	<u>57.625</u>	<u>57.7483</u>
N/W Corner:	<u>57 13/16</u>	<u>57.8125</u>	<u>57.7353</u>
S/E Corner:	<u>57 11/16</u>	<u>57.6875</u>	<u>57.7483</u>
^{W 17 X 17} S/E Corner:	<u>57 29/32</u>	<u>57.90625</u>	<u>57.7992</u>

8.1.3.40 Note the position indication for Table Elevation M-106I.

11.117

RV#35

8.1.3.41 Raise the Clamping Table to the UP position, if not already there.

Second Repeatability Test

- 8.1.3.42 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>58 1/8</u>	<u>58.125</u>	<u>58.2483</u>
N/W Corner:	<u>58 13/32</u>	<u>58.40625</u>	<u>58.3291</u>
S/E Corner:	<u>58 3/16</u>	<u>58.1875</u>	<u>58.2483</u>
S/W Corner:	<u>58 11/32</u>	<u>58.40625</u>	<u>58.2992</u>

- 8.1.3.43 Note the position indication for Table Elevation M-106I.

11.606

- 8.1.3.44 Operating the Clamping Table in the HAND mode, lower the Table Elevation M-106I to the DOWN position.

Process control time to lower 118.01 Sec.

- 8.1.3.45 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>49 3/4</u>	<u>49.75</u>	<u>49.8733</u>
N/W Corner:	<u>49 7/8</u>	<u>49.875</u>	<u>49.7978</u>
S/E Corner:	<u>49 3/4</u>	<u>49.75</u>	<u>49.8108</u>
S/W Corner:	<u>49 29/32</u>	<u>49.90625</u>	<u>49.7992</u>

- 8.1.3.46 Note the position indication for Table Elevation M-106I.

3.306

- 8.1.3.47 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the eighth W 17 X 17 rod row elevation.

NOTE: ROD ROW INDICATIONS

<u>Row</u>	<u>IND</u>
1	3.306
2	3.795
3	4.284
4	4.766
5	5.255
6	5.744
7	6.233
8	6.722
9	7.211
10	7.701
11	8.190
12	8.679
13	9.168
14	9.657
15	10.146
16	10.635

8.1.3.48 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>53 5/8</u>	<u>53.15625</u>	<u>53.2795</u>
N/W Corner:	<u>53 3/8</u>	<u>53.375</u>	<u>53.2978</u>
S/E Corner:	<u>53 7/32</u>	<u>53.21875</u>	<u>53.2796</u>
S/E ^{W 11/16} Corner:	<u>53 3/8</u>	<u>53.375</u>	<u>53.268</u>

8.1.3.49 Note the position indication for Table Elevation M-106I.

6.722

8.1.3.50 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the seventeenth W 17 X 17 rod row elevation.

8.1.3.51 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>57 5/8</u>	<u>57.625</u>	<u>57.7483</u>
N/W Corner:	<u>57 13/16</u>	<u>57.8125</u>	<u>57.8125</u>
S/E Corner:	<u>57 3/4</u>	<u>57.75</u>	<u>57.8108</u>
S/E ^{W 11/16} Corner:	<u>57 27/32</u>	<u>57.83475</u>	<u>57.7278</u>

8.1.3.52 Note the position indication for Table Elevation M-106I.

11.117

8.1.3.53 Raise the Clamping Table to the UP position, if not already there.

Third Repeatability Test

- 8.1.3.54 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>52 1/8</u>	<u>52.125</u>	<u>52.2483</u>
N/W Corner:	<u>52 5/16</u>	<u>52.3125</u>	<u>52.2353</u>
S/E Corner:	<u>52 3/16</u>	<u>52.1875</u>	<u>52.2483</u>
S/ ^W / ₈ Corner:	<u>52 3/8</u>	<u>52.375</u>	<u>52.268</u>

- 8.1.3.55 Note the position indication for Table Elevation M-106I.

11.606

- 8.1.3.56 Operating the Clamping Table in the HAND mode, lower the Table Elevation M-106I to the DOWN position.

- 8.1.3.57 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>49 11/16</u>	<u>49.6875</u>	<u>49.8108</u>
N/W Corner:	<u>49 7/8</u>	<u>49.875</u>	<u>49.7978</u>
S/E Corner:	<u>49 3/4</u>	<u>49.75</u>	<u>49.8108</u>
S/ ^W / ₈ Corner:	<u>49 15/16</u>	<u>49.9375</u>	<u>49.8305</u>

- 8.1.3.58 Note the position indication for Table Elevation M-106I.

3.306

- 8.1.3.59 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the eighth W 17 X 17 rod row elevation.

- 8.1.3.60 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>53 ¹/₈</u>	<u>53.125</u>	<u>53.2483</u>
N/W Corner:	<u>53 ¹¹/₃₂</u>	<u>53.34375</u>	<u>53.2666</u>
S/E Corner:	<u>53 ⁷/₃₂</u>	<u>53.21875</u>	<u>53.2796</u>
S/ E Corner:	<u>53 ³/₈</u>	<u>53.375</u>	<u>53.268</u>

- 8.1.3.61 Note the position indication for Table Elevation M-106I.

6.722

- 8.1.3.62 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the seventeenth W 17 X 17 rod row elevation.

- 8.1.3.63 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>57 ⁵/₈</u>	<u>57.625</u>	<u>57.7483</u>
N/W Corner:	<u>57 ¹⁷/₁₆</u>	<u>57.8125</u>	<u>57.7353</u>
S/E Corner:	<u>57 ¹¹/₁₆</u>	<u>57.6875</u>	<u>57.7483</u>
S/ E Corner:	<u>57 ²⁷/₃₂</u>	<u>57.84375</u>	<u>57.7278</u>

- 8.1.3.64 Note the position indication for Table Elevation M-106I.

11.117

- 8.1.3.65 Raise the Clamping Table to the UP position, if not already there.

- 8.1.3.66 Acceptance Criteria

Table Top remains horizontal within ± 0.09 inch of true horizontal plane in unloaded operations.

<u>David M. Olson</u>	<u>8/17/92</u>
Test Conductor	Date
<u>W. J. M. G. G. G.</u>	<u>8/17/92</u>
QA	Date

Repeatability Evaluation**NOTE**

It is desirable that the system shows repeatability errors of less than 0.01 inches which is the alignment criteria for the rod extraction process. However, measurement error with tape measures in this testing may provide a $\pm 1/16$ inch reading error. This error is acceptable for this evaluation. Subsequent functional testing will be performed which will test actual performance.

8.1.3.67 Calculate the average value for each corner measurement.

	<u>UP</u>	<u>DOWN</u>	<u>8th ROW</u>	<u>17th ROW</u>
N/E Corner:	<u>58.0833</u>	<u>49.7083</u>	<u>53.1458</u>	<u>57.625</u>
N/W Corner:	<u>58.3229</u>	<u>49.875</u>	<u>53.3542</u>	<u>57.8125</u>
S/E Corner:	<u>58.1458</u>	<u>49.75</u>	<u>53.2083</u>	<u>57.7082</u>
S/W Corner:	<u>58.3438</u>	<u>49.9062</u>	<u>53.375</u>	<u>57.8586</u> <u>57.375 - 4/11/92</u>

8.1.3.68 Evaluate the Clamping Table's repeatability as a deviation from the average value.

~~As per calculations and graphs in the daily test log, the clamping table shows repeatability at the Down, Row 8, and Row 17 position. The data at the UP position does not support repeatability. The data from the UP position will be re-verified.~~

~~Subsequent testing demonstrated that the AUTO Mode UP Setpoint provides repeatability. This setpoint is not the same when operating in the hand mode. See the calculations in the daily test log. 01/12/92~~

RETEST 8/17/92

NOTE

The following load testing with B&W 15 X 15 fuel assemblies must be performed without any interruption which changes the state of the Process Control System's position indication for the Clamping Table elevation.

Re-test

1. Jog Mode, table to mid point.
2. Restore
3. Clamp Slides Back

NOTE

The Clamping Table has been verified to be level (bubble is in center) E/W and N/S using a carpenter's level.

First Repeatability Test

- 8.1.3.30 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>58.0</u>	<u>58.0</u>	<u>58.1192</u>
N/W Corner:	<u>58 3/16</u>	<u>58.1875</u>	<u>58.1139</u>
S/E Corner:	<u>58 1/32</u>	<u>58.03125</u>	<u>58.0930</u>
S/E ^W Corner:	<u>58 1/4</u>	<u>58.25</u>	<u>58.1426</u>

- 8.1.3.31 Note the position indication for Table Elevation M-106I.

11.512 in
~~11.512 in~~ 8/17/92

- 8.1.3.32 Operating the Clamping Table in the HAND mode, lower the Table Elevation M-106I to the DOWN position.

- 8.1.3.33 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>49 11/16</u>	<u>49.6875</u>	<u>49.8067</u>
N/W Corner:	<u>49 13/16</u>	<u>49.8125</u>	<u>49.7389</u>
S/E Corner:	<u>49 3/4</u>	<u>49.75</u>	<u>49.8118</u>
S/E ^W Corner:	<u>49 7/8</u>	<u>49.875</u>	<u>49.7676</u>

RETEST 8/17/92

PCN 21
vrc
8/17/92~~8.1.3.34 Note the position indication for Table Elevation M-106I.~~N/A vrc 8/17/92

8.1.3.35 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the eighth W 17 X 17 rod row elevation.

8.1.3.36 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>53 5/32</u>	<u>53.15625</u>	<u>53.2754</u>
N/W Corner:	<u>53 9/32</u>	<u>53.28125</u>	<u>53.2876</u>
S/E Corner:	<u>53 3/16</u>	<u>53.1875</u>	<u>53.2493</u>
S/ E ^W Corner:	<u>53 3/8</u>	<u>53.375</u>	<u>53.2676</u>

PCN 21
vrc
8/17/92~~8.1.3.37 Note the position indication for Table Elevation M-106I.~~N/A vrc 8/17/92

8.1.3.38 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the seventeenth W 17 X 17 rod row elevation.

8.1.3.39 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>57 9/16</u>	<u>57.5625</u>	<u>57.6817</u>
N/W Corner:	<u>57 7/4</u>	<u>57.75</u>	<u>57.6764</u>
S/E Corner:	<u>57 1/16</u>	<u>57.6875</u>	<u>57.7493</u>
S/ E ^W Corner:	<u>57 7/8</u>	<u>57.875</u>	<u>57.7676</u>

PCN 21
vrc
8/17/92

8.1.3.40 Note the position indication for Table Elevation M-106I.

N/A vrc 8/17/92

8.1.3.41 Raise the Clamping Table to the UP position, if not already there.

RETEST 8/17/92

Second Repeatability Test

- 8.1.3.42 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>58</u>	<u>58.0</u>	<u>58.1192</u>
N/W Corner:	<u>58 ⁷/₁₆</u>	<u>58.4375</u>	<u>58.1139</u>
S/E Corner:	<u>58 ¹/₃₂</u>	<u>58.03125</u>	<u>58.0930</u>
S/E ^{Wine} Corner:	<u>58 ⁷/₃₂</u>	<u>58.21875</u>	<u>58.1114</u>

- ~~8.1.3.43 Note the position indication for Table Elevation M-106I.~~

- 51
1192
8.1.3.44 Operating the Clamping Table in the HAND mode, lower the Table Elevation M-106I to the DOWN position.

- 8.1.3.45 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u> </u>	<u> </u>	<u> </u>
N/W Corner:	<u> </u>	<u> </u>	<u> </u>
S/E Corner:	<u> </u>	<u> </u>	<u> </u>
S/E ^{Wine} Corner:	<u> </u>	<u> </u>	<u> </u>

- 8.1.3.46 Note the position indication for Table Elevation M-106I.

- 8.1.3.47 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the eighth W 17 X 17 rod row elevation.

B&W 15 X 15 Load Testing for One Assembly in the North Position

8.1.3.69 Operating the RBT in the JOG Mode, load one B&W 15 X 15 fuel assemblies to Clamping Table's North Position. Position it as required to avoid interference.

8.1.3.70 Verify that the Clamping Table's North load cell is actuated by the mock-up fuel assembly.

David M. Chapman 8/17/92
Test Conductor Date

8.1.3.71 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>57 ¹⁵/₁₆</u>	<u>57.9375</u>	<u>58.0567</u>
N/W Corner:	<u>58 ¹/₆</u>	<u>58.125</u>	<u>58.0514</u>
S/E Corner:	<u>58 ¹/₃₂</u>	<u>58.03125</u>	<u>58.0930</u>
RL#36 S/E Corner:	<u>58 ¹/₄</u>	<u>58.25</u>	<u>58.1426</u>

TPCN 21
8/17/92
~~8.1.3.72 Note the position indication for Table Elevation M-106I.~~
N/A on 8/17/92

8.1.3.73 Operating the Clamping Table in the HAND mode, lower the Table Elevation M-106I to the DOWN position.

8.1.3.74 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>49 ⁵/₈</u>	<u>49.625</u>	<u>49.7442</u>
N/W Corner:	<u>49 ¹³/₁₆</u>	<u>49.8125</u>	<u>49.7389</u>
S/E Corner:	<u>49 ³/₄</u>	<u>49.75</u>	<u>49.8118</u>
S/E Corner:	<u>49 ²⁷/₃₂</u>	<u>49.84375</u>	<u>49.7988</u>

TPCN 21
8/19/92
~~8.1.3.75 Note the position indication for Table Elevation M-106I.~~
N/A on 8/17/92

8.1.3.76 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the eighth W 17 X 17 rod row elevation.

8.1.3.77 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>53 1/8</u>	<u>53.125</u>	<u>53.2442</u>
N/W Corner:	<u>53 9/32</u>	<u>53.28125</u>	<u>53.2076</u>
S/E Corner:	<u>53 3/16</u>	<u>53.1875</u>	<u>53.2493</u>
RL#36 S/E ^{7/16} Corner:	<u>53 7/16</u>	<u>53.4375</u>	<u>53.3301</u>

TPCN 21
w/c
8/19/92

~~8.1.3.78 Note the position indication for Table Elevation M-106I.~~

N/A w/c 8/17/92

8.1.3.79 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the seventeenth W 17 X 17 rod row elevation.

8.1.3.80 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>57 9/16</u>	<u>57.5625</u>	<u>57.6817</u>
N/W Corner:	<u>57 3/4</u>	<u>57.75</u>	<u>57.6764</u>
S/E Corner:	<u>57 11/16</u>	<u>57.6875</u>	<u>57.7493</u>
S/E ^{7/16} Corner:	<u>57 27/32</u>	<u>57.84375</u>	<u>57.7364</u>

TPCN 21
w/c
8/19/92

~~8.1.3.81 Note the position indication for Table Elevation M-106I.~~

N/A w/c 8/17/92

8.1.3.82 Raise the Clamping Table to the full UP position, if not already UP.

NOTE

IF repeatability error in excess of 1/16 inch was observed during the unloaded tests, THEN repeat the loaded testing two more times and use the average values for comparison to the unloaded value average.

B&W 15 X 15 Load Testing for One Assembly in the South Position

8.1.3.83 Operating the RBT in the JOG Mode, remove the B&W 15 X 15 fuel assembly from the Clamping Table's North position and place it in the South position.

8.1.3.84 Verify that the Clamping Table's South load cell is actuated by the mock-up fuel assembly.

Nigel McLean 2/18/92
Test Conductor Date

8.1.3.85 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>$58\frac{1}{32}$</u>	<u>58.03125</u>	<u>58.1504</u>
N/W Corner:	<u>$58\frac{3}{16}$</u>	<u>58.1875</u>	<u>58.1139 m 8/18/92</u>
S/E Corner:	<u>$58\frac{1}{32}$</u>	<u>58.03125</u>	<u>58.0930</u>
S/W ^{W 8/18/92} Corner:	<u>$58\frac{7}{32}$</u>	<u>58.21875</u>	<u>58.1114</u>

TPCN 21
v. 2
8/19/92
~~8.1.3.86 Note the position indication for Table Elevation M-106I.~~
N/A m 2/17/92

8.1.3.87 Operating the Clamping Table in the HAND mode, lower the Table Elevation M-106I to the DOWN position.

8.1.3.88 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>$49\frac{11}{16}$</u>	<u>49.6875</u>	<u>49.8067</u>
N/W Corner:	<u>$49\frac{27}{32}$</u>	<u>49.84375</u>	<u>49.7702</u>
S/E Corner:	<u>$49\frac{3}{4}$</u>	<u>48.75</u>	<u>49.8118</u>
S/W ^{W 8/18/92} Corner:	<u>$49\frac{7}{8}$</u>	<u>49.875</u>	<u>49.7576</u>

TPCN 21
v. 2
8/19/92
~~8.1.3.89 Note the position indication for Table Elevation M-106I.~~
N/A m 2/17/92

8.1.3.90 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the eighth W 17 X 17 rod row elevation.

8.1.3.91 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>53 1/4</u>	<u>53.125</u>	<u>53.2442</u>
N/W Corner:	<u>53 5/16</u>	<u>53.3125</u>	<u>53.2789</u>
S/E Corner:	<u>53 7/16</u>	<u>53.4375</u>	<u>53.2493</u>
S/W ^{WPAK} Corner:	<u>53 3/8</u>	<u>53.375</u>	<u>53.2676</u>

TPCN 21
WPAK
8/19/92 | ~~8.1.3.92 Note the position indication for Table Elevation M-106I.~~
N/A M-8/17/92

8.1.3.93 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the seventeenth W 17 X 17 rod row elevation.

8.1.3.94 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>57 5/8</u>	<u>57.625</u>	<u>57.7442</u>
N/W Corner:	<u>57 27/32</u>	<u>57.84375</u>	<u>57.7702</u>
S/E Corner:	<u>57 5/8</u>	<u>57.625</u>	<u>57.6868</u>
S/W ^{WPAK} Corner:	<u>57 13/16</u>	<u>57.8125</u>	<u>57.7051</u>

TPCN 21
WPAK
8/19/92 | ~~8.1.3.95 Note the position indication for Table Elevation M-106I.~~
N/A M-8/17/92

8.1.3.96 Raise the Clamping Table to the full UP position, if not already UP.

NOTE

IF repeatability error in excess of 1/16 inch was observed during the unloaded tests, THEN repeat the loaded testing two more times and use the average values for comparison to the unloaded value average.

B&W 15 X 15 Load Testing for Two Assemblies

- 8.1.3.97 Operating the RBT in the JOG Mode, remove the B&W 15 X 15 fuel assembly from the Clamping Table's South position and place it in the North position.

NOTE

Monitor the loading of the second assembly for clearance of the FAHF from the first assembly. Note the distance for information only.

- 8.1.3.98 Operating the RBT in the JOG Mode, load a second B&W 15 X 15 fuel assemblies to the Clamping Table in the South position. Position it as required to avoid interference.

- 8.1.3.99 As the PWR FAHF is opened to release the second assembly, note the distance (using a tape measure) between the North face of the FAHF from the fuel assembly in the North position.

FAHF Clearance: 43/4" (tape measure)

- 8.1.3.100 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>58</u>	<u>58.0</u>	<u>58.1192</u>
N/W Corner:	<u>58 5/32</u>	<u>58.15625</u>	<u>58.0826</u>
S/E Corner:	<u>58 1/32</u>	<u>58.03125</u>	<u>58.6375</u> ⁰⁹³⁰ 8118192
S/W Corner:	<u>58 1/4</u>	<u>58.25</u>	<u>58.1426</u>

- ~~8.1.3.101 Note the position indication for Table Elevation M-106I.~~

U/A v/c 8117K2

- 8.1.3.102 Operating the Clamping Table in the HAND mode, lower the Table Elevation M-106I to the DOWN position.

8.1.3.103 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>49 11/16</u>	<u>49.6875</u>	<u>49.8067</u>
N/W Corner:	<u>49 13/16</u>	<u>49.8125</u>	<u>49.7389</u>
S/E Corner:	<u>49 3/4</u>	<u>49.75</u>	<u>49.8118</u>
S/ E ^W Corner:	<u>49 7/8</u>	<u>49.875</u>	<u>49.7676</u>

21
14192 | ~~8.1.3.104 Note the position indication for Table Elevation M-106I.~~
N/A v. 2/17/92

8.1.3.105 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the eighth W 17 X 17 rod row elevation.

8.1.3.106 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>53 1/8</u>	<u>53.125</u>	<u>53.2442</u>
N/W Corner:	<u>53 5/16</u>	<u>53.3125</u>	<u>53.2389</u>
S/E Corner:	<u>53 3/16</u>	<u>53.1875</u>	<u>53.2493</u>
S/ E ^W Corner:	<u>53 13/32</u>	<u>53.40625</u>	<u>53.2988</u>

21
14192 | ~~8.1.3.107 Note the position indication for Table Elevation M-106I.~~
N/A v. 2/17/92

8.1.3.108 Operating the Clamping Table in the HAND mode, raise the Table Elevation M-106I to the seventeenth W 17 X 17 rod row elevation.

8.1.3.109 Note the Clamping Table elevations from the floor at each corner using a tape measure.

	<u>In Fractions</u>	<u>In Decimals</u>	<u>Normalized</u> (If Applicable)
N/E Corner:	<u>57 ⁵/₈</u>	<u>57.625</u>	<u>57.7442</u>
N/W Corner:	<u>57 ³/₄</u>	<u>57.75</u>	<u>57.6764</u>
S/E Corner:	<u>57 ⁵/₈</u>	<u>57.625</u>	<u>57. ⁶⁸⁶⁸6868 ⁰¹¹⁷⁹²</u>
S/ E ^{W 5/8 192} Corner:	<u>57 ¹³/₁₆</u>	<u>57.8125</u>	<u>57.7051</u>

TPCN 21
8/19/92
8.1.3.110 ~~Note the position indication for Table Elevation M-106I.~~
Value 011792

8.1.3.111 Raise the Clamping Table to the full UP position, if not already UP.

NOTE

IF repeatability error in excess of 1/16 inch was observed during the unloaded tests, THEN repeat the loaded testing two more times and use the average values for comparison to the unloaded value average.

- 8.1.3.112 Operating the RBT in the JOG Mode, remove the two B&W 15 X 15 fuel assemblies from the Clamping Table.

NOTE

The absolute measurements may require normalization for slight variations in floor elevations. To normalize:

- . Add the sum of measurements made for each specific load and elevation condition for each corner.
- . Take the average of the repeated corner measurements.
- . Take the average of the corner measurements at each load and elevation condition. This provides the average for the table at each load and elevation condition.
- . Subtract the average specific corner measurements from the averaged table load and elevation measurements. This will provide a specific elevation offset for each corner for each load and elevation condition.
- . Average the specific corner elevation offsets across load and elevations. This provides the final corner elevation offset for use in normalization of the discrete measurements.
- . Add this final corner offset to the listed decimal values for each specific corner to obtain the normalized measurement for the corner. Note that adding a negative number is subtracting.

This should be done if the raw data does not meet the criteria. Record all calculations in the Daily Test Log.

- 8.1.3.113 Note any elevation off-sets used or enter "N/A".

N/E Corner: 0.1192

N/W Corner: - 0.0736

S/E Corner: 0.0618

^{WVHKL}
S/~~E~~ Corner: - 0.1074

- 8.1.3.114 Calculate the average load deflection of the Clamping Table at each elevation. This can be done by subtracting the loaded value from the unloaded value for each comparable set of corner measurements. The resultant corner deflections are then averaged to provide an estimate of table top center deflection. Record any calculations in the Daily Test Log.

Note the average deflections at elevations:

	NORTH	SOUTH	EAST
Full UP:	<u>-0.0365"</u>	<u>-0.0052</u>	<u>-0.0080</u>
Full DOWN:	<u>-0.0293</u>	<u>-0.0136</u>	<u>-0.0215</u>
At 8th Row:	<u>-0.0078</u>	<u>-0.0156</u>	<u>-0.0078</u>
At 17th Row:	<u>-0.0332</u>	<u>-0.0176</u>	<u>-0.0411</u>
Ave:	<u>-0.0267</u>	<u>-0.0130</u>	<u>-0.0208</u>

Average the elevation readings to obtain the final deflection value for full load conditions.

Loaded Deflection: 0.0208"

- 8.1.3.115 Evaluate the effects of operating with a single assembly on the Clamping Table. Compare data to record any tilt deflection.

Data is developed in the test log. Data is inconsistent
showing tilt on the North side and negative tilt on the South
side. This is attributed to measurement error since the value
is less than 1/16". It is noise. No measurable tilt is observed.

8.1.3.116 Acceptance Criteria

- ALW36
- The Clamping Table remains horizontal within ± 0.09 inch of true horizontal plane in loaded, unloaded, and partially loaded operations.
 - The vertical deflection of the midpoint of the Clamping Table is less than 0.06 inches relative to unloaded conditions.
- ALW37
- The Fuel Assembly Handling Fixture is able to load and unload the mock-up fuel assemblies into position.

David M. Evans 2/18/92
 Test Conductor Date
D. W. Lyons 2/18/92
 QA Date

Westinghouse 17 X 17 Testing

See TPCN 23 for further testing. E.13.117-157
David M. Chapman 9/30/92

- 8.1.3.117 Ensure that the Accountability System indicates NO fuel on the Downender, RBT, or Clamping Table.
- 8.1.3.118 Drive Lower Clamp Slide M-106B to the FWD position.
- 8.1.3.119 Drive Upper Clamp Slide M-106A to the FWD position.

WARNING

All personnel must be clear of the test area during hand mode operations of the RBT.

NOTE

Downender and RBT operations may be performed as per DOP-005 and DOP-017 as a guide. These actual operations are transparent to this test procedure.

- 8.1.3.120 Place the first W 17 X 17 mock-up fuel assembly in the Downender in a vertical position with the Downender's Bottom Support M-103B at fuel-specific raised setpoint.
- 8.1.3.121 Verify that the fuel assembly serial number is displayed on the Downender control screen.
- 8.1.3.122 Lower the first fuel assembly to the Downender's cradle and raise the Downender carriage.

CAUTION

Test Log entry 0730 on 6/5/92 indicated that the fuel could not be loaded unless the lower clamp slide was back. This test seeks to resolve this issue.

CAUTION

Loading the complete Westinghouse 17 X 17 fuel assembly to the Clamping Table will result in contact interference with the Rod Extraction System. Be prepared to use the HALT or Emergency Stop functions as the assembly is lowered. RBT operations are then to be performed in the JOG mode to safely position the assemblies in the Clamping Table. The JOG mode offsets used are to be recorded.

1.3.123 Operating the RBT with PWR FAHF in the HAND mode, transfer a Westinghouse 17 X 17 mock-up fuel assembly from the Downender cradle to the North Clamping Table position.

1.3.124 As the RBT is lowering the complete W 17 X 17 fuel assembly, actuate HALT on the RBT control screen.

1.3.125 Record the RBT's position indications.

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

1.3.126 Place the RBT in the JOG Mode to continue placement of the assembly on the Clamping Table. Move the bridge South as required to obtain the minimum fuel assembly clearance with the Rod Extraction System.

1.3.127 WHEN the fuel assembly is in position, THEN record the RBT's position indications.

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

1.3.128 Calculate the required Bridge offset to load a complete W 17 X 17 assembly to the table.

BRIDGE OFFSET: _____

- 8.1.3.129 Verify that Trolley position was correct for fuel assembly placement.

Test Conductor

Date

NOTE

The ends of the fuel rods, after end fitting removal, are expected to be one inch West of the East End of the Clamping Table.

- 8.1.3.130 Record the distance of the East end of the fuel rods from the East end of the Clamping Table.

Measured Distance: _____

Less Bridge Offset: _____

Effective Distance: _____

NOTE

Editing of the Accountability System for fuel assembly transfer in the JOG mode may be required to indicate the fuel assembly serial numbers on the PWR Clamping Table control screen.

8.1.3.131 Acceptance Criteria

- . The mockup fuel assembly was successfully placed by the RBT in the North Clamping Table position.
- . The PWR Clamping Table control screen indicates that a fuel assembly is present at the SERIAL 1 location.

Test Conductor

Date

QA

Date

- 8.1.3.132 Move the RBT clear of the Clamping Table and perform the restore process.

- 8.1.3.133 Observe clamp alignment with the fuel assembly.

NOTE

Use jog-mode offset to evaluate the centerline positions.

8.1.3.134 Acceptance Criteria

- Centerline of the lower clamps align with the lower end fitting of the mock-up fuel assembly.
- Centerline of the upper clamps align with the upper grid of the mock-up fuel assembly.
- Centerline of the intermediate saddles align with grids.

Test Conductor Date

QA Date

Second W 17 X 17 Fuel Assembly

- 8.1.3.135 Place the second W 17 X 17 mock-up fuel assembly in the Downender in a vertical position with the Downender's Bottom Support M-103B at fuel-specific raised setpoint.
- 8.1.3.136 Verify that the fuel assembly serial number is displayed on the Downender control screen.
- 8.1.3.137 Lower the second fuel assembly to the Downender's cradle and raise the Downender carriage.

CAUTION

Loading the complete Westinghouse 17 X 17 fuel assembly to the Clamping Table will result in contact interference with the Rod Extraction System. Be prepared to use the HALT or Emergency Stop functions as the assembly is lowered. RBT operations are then to be performed in the JOG mode to safely position the assemblies in the Clamping Table. The JOG mode offsets used are to be recorded.

- .1.3.138 Operating the RBT with PWR FAHF in the HAND mode, transfer the second Westinghouse 17 X 17 mock-up fuel assembly from the Downender cradle to the South Clamping Table position.
- .1.3.139 As the RBT is lowering the complete W 17 X 17 fuel assembly, actuate HALT on the RBT control screen.
- .1.3.140 Record the RBT's position indications.

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

NOTE

Monitor the loading of the second assembly for clearance of the FAHF from the first assembly.

8.1.3.141 Place the RBT in the JOG Mode to continue placement of the assembly on the Clamping Table. Move the bridge South as required to obtain the minimum fuel assembly clearance with the Rod Extraction System

8.1.3.142 WHEN the fuel assembly is in position, THEN record the RBT's position indications.

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

8.1.3.143 As the Fuel Assembly Handling Fixture Clamp M-121G is opened, obtain (with a tape measure) and record the clearance between the North face of the clamp and the W 17 X 17 fuel assembly in the North position on the Clamping Table. (For information only.)

FAHF/W 17 X 17 Clearance: _____

8.1.3.144 Calculate the required Bridge offset to load a complete W 17 X 17 assembly to the table.

BRIDGE OFFSET: _____

8.1.3.145 Verify that Trolley position was correct for fuel assembly placement.

Test Conductor _____ Date _____

NOTE

Editing of the Accountability System for fuel assembly transfer in the JOG mode may be required to indicate the fuel assembly serial numbers on the PWR Clamping Table control screen.

8.1.3.146 Acceptance Criteria

- The mockup fuel assembly was successfully placed in the South Clamping Table position.
- The PWR Clamping Table control screen indicates that a fuel assembly is present at the SERIAL 2 location.

Test Conductor _____

Date _____

QA _____

Date _____

NOTE

This closes Exception/Repair Log # 15.

.1.3.147 Move the RBT clear of the Clamping Table.

.1.3.148 Observe clamp alignment with the fuel assembly.

NOTE

Use jog-mode offset to evaluate the centerline positions.

.3.149 Acceptance Criteria

- Centerline of the lower clamps align with the lower end fitting of the mock-up fuel assembly.
- Centerline of the upper clamps align with the upper grid of the mock-up fuel assembly.
- Centerline of the intermediate saddles align with grids.

Test Conductor _____

Date _____

QA _____

Date _____

Clamp Closure Demonstration**NOTE**

IF the fuel assembly offset does not allow for clamp alignment with the lower end fitting or upper grids, THEN do NOT close the clamps on the mock-up fuel assembly. Perform this testing later on a test rig which matches W 17 X 17 cross-sectional dimensions and explain in the Daily Test Log.

8.1.3.150 Close Lower Clamp 1 M-106C and Lower Clamp 2 M-106D.

8.1.3.151 Record the Lower Clamp position indications:

LOWER CLAMP 1 M-106C: _____

LOWER CLAMP 2 M-106D: _____

8.1.3.152 Acceptance Criteria

Lower clamps grip fuel assembly end fittings.

Test Conductor Date

QA Date

8.1.3.153 Close Upper Clamp 1 M-106E2 and Upper Clamp 2 M-106G2.

8.1.3.154 Record the Upper Clamp position indications:

UPPER CLAMP 1 M-106E2: _____

UPPER CLAMP 2 M-106G2: _____

8.1.3.155 Acceptance Criteria

Upper clamp bars rotate and press down on the fuel assembly grids.

Test Conductor Date

QA Date

NOTE

This closes the issues raised by TPCN 7.

8.1.3.156 Open all clamps on the clamping table.

8.1.3.157 Acceptance Criteria

Clamps open.

Test Conductor	Date
----------------	------

QA	Date
----	------

Rod Alignment Re-Verification

TPCN 24 for test
 Step 3.1.158 to 252
 7/10/92

NOTE

This testing re-performs testing as per TPCN 8 to functionally verify that the Clamping Table rod-row setpoints are accurate.

- 3.1.3.158 Set up the alignment gage and test rods as described in TPCN 8 EXCEPT use only one pull head and the center test rod. Operate in the jog mode as required to position the alignment gage and the center test rod. Restore the system for Clamping Table initialization after setup is established.

Note the Pull Head selected: _____

- 1.3.159 Move the two Westinghouse 17 X 17 fuel assemblies on the clamping table in a position sufficiently East to accommodate the alignment gage OR use equivalent test weights distributed symmetrically on the Clamping Table. Ensure that the fuel assemblies are properly supported if they are used.

- 3.160 Place the Rod Extraction System in the HAND Mode.

- 3.161 Close the Upper End Clamp on the alignment gage.

Rod Row 1 Alignment

- 3.162 Lower the Clamping Table to the DOWN position.

- 3.163 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 3.164 Extend the selected Pull Head Drive M-107 A OR M-107B forward to test rod alignment.

- 3.165 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor _____

Date _____

- 3.166 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 2 Alignment

- 3.167 Index the PWR Clamping Table to the second rod row.

- 8.1.3.168 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 8.1.3.169 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.

- 8.1.3.170 Verify that the rod alignment test rod inserted into the alignment gage.

_____	_____
Test Conductor	Date

- 8.1.3.171 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 3 Alignment

- 8.1.3.172 Index the PWR Clamping Table to the third rod row.

- 8.1.3.173 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 8.1.3.174 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.

- 8.1.3.175 Verify that the rod alignment test rod inserted into the alignment gage.

_____	_____
Test Conductor	Date

- 8.1.3.176 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 4 Alignment

- 8.1.3.177 Index the PWR Clamping Table to the fourth rod row.

- 8.1.3.178 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 8.1.3.179 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.

- 8.1.3.180 Verify that the rod alignment test rod inserted into the alignment gage.

_____	_____
Test Conductor	Date

.181 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 5 Alignment

3.182 Index the PWR Clamping Table to the fifth rod row.

3.183 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

1.3.184 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.

.1.3.185 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor Date

8.1.3.186 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 6 Alignment

8.1.3.187 Index the PWR Clamping Table to the sixth rod row.

8.1.3.188 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

8.1.3.189 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.

8.1.3.190 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor Date

8.1.3.191 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 7 Alignment

8.1.3.192 Index the PWR Clamping Table to the seventh rod row.

8.1.3.193 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

8.1.3.194 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.

- 8.1.3.195 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor Date

- 8.1.3.196 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 8 Alignment

- 8.1.3.197 Index the PWR Clamping Table to the eighth rod row.
- 8.1.3.198 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 8.1.3.199 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.
- 8.1.3.200 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor Date

- 8.1.3.201 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 9 Alignment

- 8.1.3.202 Index the PWR Clamping Table to the ninth rod row.
- 8.1.3.203 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 8.1.3.204 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.
- 8.1.3.205 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor Date

- 8.1.3.206 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 10 Alignment

- 8.1.3.207 Index the PWR Clamping Table to the tenth rod row.

- 8.1.3.208 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 8.1.3.209 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.
- 8.1.3.210 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor

Date

- 1.3.211 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 11 Alignment

- 1.3.212 Index the PWR Clamping Table to the eleventh row.
- 1.3.213 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 1.3.214 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.
- 1.3.215 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor

Date

- 1.3.216 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 12 Alignment

- 1.3.217 Index the PWR Clamping Table to the twelfth rod row.
- 1.3.218 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 1.3.219 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.
- 1.3.220 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor

Date

8.1.3.221 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 13 Alignment

8.1.3.222 Index the PWR Clamping Table to the thirteenth rod row.

8.1.3.223 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

8.1.3.224 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.

8.1.3.225 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor Date

8.1.3.226 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 14 Alignment

8.1.3.227 Index the PWR Clamping Table to the fourteenth rod row.

8.1.3.228 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

8.1.3.229 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.

8.1.3.230 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor Date

8.1.3.231 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 15 Alignment

8.1.3.232 Index the PWR Clamping Table to the fifteenth rod row.

8.1.3.233 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

8.1.3.234 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.

- 1.3.235 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor Date

- 1.3.236 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 16 Alignment

- 1.3.237 Index the PWR Clamping Table to the sixteenth rod row.
1.3.238 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 1.3.139 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.
1.3.240 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor Date

- 3.241 Retract the selected Pull Head Drive M-107A or M-107B.

Rod Row 17 Alignment

- .242 Index the PWR Clamping Table to the seventeenth rod row.
.243 Record the PWR Clamping Table Table Elevation M-106I's Position indication.

Table Elevation M-106I: _____

- 244 Extend the selected Pull Head Drive M-107 A or M-107B forward to test rod alignment.
245 Verify that the rod alignment test rod inserted into the alignment gage.

Test Conductor Date

- 46 Retract the selected Pull Head Drive M-107A or M-107B.
47 Raise the Clamping Table to the UP position, if not already UP.

NOTE

IF test data obtained in this retest indicates significant variations due to repeatability error, excessive table deflection, or as otherwise deemed appropriate by the test conductor, THEN the rod alignment test should be repeated.

8.1.3.248 IF warranted by test observations made above, THEN re-perform the rod-alignment retest and attach to this TPCN. Describe any variations made for the retest in the test log.

_____ Alignment test re-performed OR

_____ Not applicable

8.1.3.249 Acceptance Criteria

The pull head and fuel rods are aligned in the same plane ± 0.01 inches.

Test Conductor Date

QA Date

Removal of W 17 X 17 Assemblies
NOTE

If test weights are used above in the rod alignment test, then the following steps may be performed out-of-sequence.

- 1.3.250 Operating the RBT in the HAND or JOG Mode, remove the W 17 X 17 fuel assembly from the North Clamping Table position.
- .3.251 Operating the RBT in the HAND or JOG Mode, remove the W 17 X 17 fuel assembly from the South Clamping Table position.

NOTE

The Accountability System is edited to update the system for transfer operations performed in the JOG mode.

3.252 Acceptance Criteria

The control system indicates no load on the Clamping Table.

Test Conductor _____ Date _____

QA _____ Date _____

CCTV CAMERA CALL TEST

8.1.3.253 Place the Clamping Table in the SINGLE Mode and initiate operations to raise or lower the Table Elevation M-106I servo drive.

8.1.3.254 As the Table Elevation M-106I is driving, simulate a fault condition.

8.1.3.255 Acceptance Criteria

- . The motor stops when the fault is implemented.
- . The alarm system is activated.
- . The control system displays a FAULT condition on the control screen.
- . An alarm message is printed.

Wing M. Chan 9/29/92
Test Conductor Date

[Signature] 9/29/92
QA Date

247 8.1.3.256 Actuate ALARM ACK on the Clamping Table - Elevation and Slide control screen.

8.1.3.257 Acceptance Criteria

- . The audio alarm is silenced.
- . An acknowledgement message is printed.

Wing M. Chan 9/29/92
Test Conductor Date

[Signature] 9/29/92
QA Date

8.1.3.258 Actuate the CALL CAMERA feature on the Clamping Table-Elevation and Slide control screen.

247 8.1.3.259 Observe that CCTV Cameras 3 and 7 are displayed on the console monitors. Adjust for view of the Table Elevation motor and table top.

8.1.3.260 Complete CCTV Assessment forms (Appendix E) for visual coverage. nc 4/1/92

8.1.3.261 Position the RBT in the JOG Mode for CCTV coverage with Cameras 9 and 10.

8.1.3.262 Complete CCTV Assessment forms (Appendix E) for visual coverage. *mc 9/29/92*

8.1.3.263 Acceptance Criteria

RL #47

- . Video images from CCTV Camera # 3 and # 7 are displayed on the console monitors with the CAMERA CALL.
- . CCTV Camera # 3 provides an unobstructed view of the faulted drive subassembly and components.
See assessment form TPC 9/29/92
- . CCTV Camera # 7 provides an unobstructed view of the table top drive assemblies and table top condition.

David M. Chen *9/29/92*

Test Conductor Date

QA [Signature] *9/29/92*

QA Date

8.1.3.264 Reset the fault condition for Table Elevation M-106I. Clear the FAULT indication and observe that the alarm reset message is printed.

8.1.3.265 Resume SINGLE Mode operations.

8.1.3.266 Acceptance Criteria

The system can be recovered from a fault condition and single mode operations continued.

David M. Chen *9/29/92*

Test Conductor Date

QA [Signature] *9/29/92*

QA Date

8.1.3.267 Obtain setpoint printouts for the Clamping Table, ~~the Downender's bottom support and the RBT's~~ positioning. Attach to this re-test procedure. *TPCN 25 9/29/92*

8.1.3.268 Perform actions as required to terminate testing, close paperwork, and return the cell to normal.

8.1.3.269 Clamping Table SOT testing is completed.

David M. Chen *9/29/92*

Test Conductor Date

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 7/23/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) See below

PROCEDURE CHANGE: (Use reverse side if necessary.)

Make the following minor procedural corrections

1. Section 8.1.6.3, Page 32, revise reference section from "8.1.2" to "8.3.2" to maintain referencing following TPCN 1's deletion of section 8.1.2.
2. Section 8.1.6, Page 32, NOTE - Delete the note which is not related to conduct of testing.
3. Section 3.4, Page 3 - revise to add "... or are otherwise available for testing." This explains step sign-off as per RL 42.
4. Replace previous pages 90 & 91 (attached) with clean sheets. Section 8.3.2 (8.3.2) was lined through without TPCN. This section will be performed for 17x17.

REASON FOR CHANGE:

Continued on next page

See each item.

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☐ NO ☐

MAJOR ☐ YES ☐ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

Daniel M. Chap 7/31/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE
Continuation Sheet

DATE 7/23/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) See below

PROCEDURE CHANGE: (Use reverse side if necessary.)

5. Correct Lower End Clamp^{slide} to M-106B and Upper End Clamp^{slide} to M-106A to reflect actual designation.
Page 90, 8.3.2.2 (also add "slide" designations)
Page 94-96, 8.3.4.1 and 8.3.4.2, 22 places (also, add "slide" and "end" designations).
Note: It is not clear why 8.3.4.1 and 8.3.4.2 were modified from A to B and B to A. However, this does not impact test validity.
6. 8.3.4.3, Page 97, clarify "lower end clamp position 1 (M-106C)"
7. 8.3.4.4, Page 97, clarify "lower end clamp position 2 (M-106D)"
8. 8.3.4.5, Page 98, clarify "upper end clamp drive position 1 (M-106E)"
9. 8.3.4.6, Page 99, clarify "upper end clamp drive position 2 (M-106F)"
10. 8.3.4.7, Page 100, clarify "clamp table elevation drive (M-106I)" 3 places
Also Page 101, 1 place
11. 8.1.3, Page 23, revise step 3 to reference "8.3.1.1 below" since 8.1.1.1 was deleted by TPCN 1. Same for 8.1.4, Page 27, step 6.
12. 8.1.3, Page 22, revise note to delete non-procedural section related to test coverage. This is an administrative comment not relevant to testing.
13. 8.3.1.2, Page 81, revise header to read; "Verify the Upper End clamp slide (M-106A)..." to clarify which clamp slide is tested.
14. 8.3.1.3, Page 82, revise header to read; "Verify the lower end clamp, position 1 (M-106C)..." to clarify which clamp is tested.
15. 8.3.1.3.9, Page 85, revise step to read; "Repeat steps 1 through 8 above for lower end clamp drive, position 2 (M-106D)." to clarify which clamp is being tested.
16. 8.3.1.4, Page 85, revise header to read; "Verify the lower end clamp slide (M-106B)..." to clarify and correct slide designation.
17. 8.3.1.5, Page 87, revise header to read; "Verify the upper end position 1 clamp slide (M-106E)" to clarify and correct clamp designation.
18. 8.3.2, Page 90, correct section number from "8.2.2" to "8.3.2" to correct typo.

3
8.2.2

Verify operation of load cells in clamp positions No. 1 and No. 2 as follows.

1. Place the clamps into the Hand Mode of operation and drive all clamps upper and lower to the open position.
2. Drive lower clamp motor (M-106A) and upper clamp motor (M-106B) in position to receive a fuel assembly.

WARNING

All personnel must be clear of test area during movement of the RBT. Care must be exercised when operating the RBT to avoid damage to the RBT or incell equipment.

3. Place the RBT in 'JOG Mode' on the control screen at 50% speed.
4. Jog RBT in position above a 100 lb test weight in the cell laydown area.
5. Lower the auxiliary hoist and hook it to the test weight.
6. Lift the test weight until it will clear the clamps on the clamping table (~75 inches off the floor)
7. Maneuver test weight in position over lower clamp assembly Clamp Position No. 1 and lower onto clamp assembly support (9315-M-2114, item 3) plate

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

NOTE

Insure that the total weight is full seated on the clamp.

Acceptance Criteria

- Control System indicates presence of fuel in Clamp Position No. 1.
- Control System indicates NO fuel in Clamp Position No. 2

Test Conductor _____ Date _____

QA _____ Date _____

8. Remove test weight from Position No. 1 and move it to clamp position No. 2.

Acceptance Criteria

- Control System indicates NO fuel in Clamp Position No. 1.
- Control System indicates presence of fuel in Clamp Position No. 2.

9. Remove test weight from Clamp Position No. 2 and repeat steps 7 thru 8. | 1

Acceptance Criteria

- Control System indicates presence of fuel each time the mockup fuel assembly is placed into the clamp position.
- The remain position indicates NO fuel.

Test Conductor _____ Date _____

QA _____ Date _____

10. All Steps 1 thru 9 were completed.

Test Conductor _____ Date _____

8.3.3 Verify rod extraction system interface as follows:

1. If clamp table top is not in full down position reverse direction and drive table top down until the drive motor automatically turns off.
2. Measure and record the distance from a fixed reference surface to the center line through the pull head grippers. | 1

Type of Measuring Device _____	Range _____
Identification No. _____	Calibration Due Date _____

Distance for Pull Head A _____

Distance for Pull Head B _____

NOTE: Reference design distance is 61.88 inches.

Test Conductor _____ Date _____

QA _____ Date _____

TPCN #1

LE TEST MAKE
T/C N
6/4/12
JAY

TEST PROCEDURE

9315-TP-202

REVISION

1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 7/23/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) 8.1.6.7, Page 33

Reference RL #16

PROCEDURE CHANGE: (Use reverse side if necessary.)

Revise "2600 ± 50" (As per TPCN 9) to "2600 + 250/-50" lbs.

REASON FOR CHANGE:

Revise criteria's tolerance to be acceptable for field conditions.
2800 lbs is close enough to 2600 lbs in field test conditions.

Reference TAC change Notice 007, Item 4.

CLASSIFICATION OF CHANGE

MINOR ☐ YES ☐ NO ☐

MAJOR ☐ YES ☒ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

<u>David M. Chap</u>	<u>7/23/92</u>	(1)(2)
TEST ENGINEER	DATE	
<u>A. M. M. M. M.</u>	<u>10/6/92</u>	(2)
QUALITY ASSURANCE	DATE	
<u>F. M. M. M.</u>	<u>10/6/92</u>	(2)
PROJECT ENGINEER	DATE	
<u>Peter V. M. M.</u>	<u>10/6/92</u>	(2)
TEST DIRECTOR	DATE	

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 7/24/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) 8.3.2 (Page 90)

PROCEDURE CHANGE: (Use reverse side if necessary.)

1. Reverse Steps 3 to 7, 8, and 9 to use a Westinghouse 17x17 "test weight".
2. Eliminate use of PBT auxiliary hook. Method of transfer is transparent to acceptance criteria.
3. Enable use of hand mode. Method of transfer is transparent to acceptance criteria. (Steps 3 & 4)
 step 3 - add "or hand mode"
 step 4 - revise "jug" to "locals"
 step 4 - replace "100 lb" with "W 17x17"
 step 5 - revise to "Pickup to W 17x17 test weight"
 step 7, 8, & 9 revise to "W 17x17 test weight"

REASON FOR CHANGE:

Revise test procedure wording to conform with current acceptance criteria. W 17x17 load cell testing will be performed.

Reference TAC (N) 002 for clarification.

CLASSIFICATION OF CHANGE

MINOR YES ☒ NO ☐

TPCN enables intent of acceptance criteria, therefore is a minor TPCN.

MAJOR YES ☐ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED YES ☐ NO ☐

APPROVALS

*This TPCN is voided,
testing is performed as
per TPCN 10
V. Chapman
7/24/92*

Nigel M. Chapman 7/24/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 7/24/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) 8.3.1.5

Reference PL # 13

PROCEDURE CHANGE: (Use reverse side if necessary.)

on page 88, 8.3.1.5.7, revise acceptance criteria to "Clamp Force is 160 to 200 lbs.

Similar for Page 89, 8.3.1.5.8 & 8.3.1.5.9

REASON FOR CHANGE:

Reference TAC CN 007, Item 18. The observed 160 to 200 clamp Force range was acceptable in that the rod extraction Force tests were successfully completed.

CLASSIFICATION OF CHANGE

MINOR ☐ YES ☐ NO ☐

MAJOR ☐ YES ☒ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

<u>David M. Chapman</u>	<u>7/24/92</u>	(1)(2)
TEST ENGINEER	DATE	
<u>A. J. [Signature]</u>	<u>10/6/92</u>	(2)
QUALITY ASSURANCE	DATE	
<u>J. M. Delle</u>	<u>10/6/92</u>	(2)
PROJECT ENGINEER	DATE	
<u>Peter [Signature]</u>	<u>10/6/92</u>	(2)
TEST DIRECTOR	DATE	

- Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE

9315-TP-202

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TEMPORARY PROCEDURE CHANGE NOTICE

DATE 7/30/92

PROCEDURE NO. 9315-TP-202

REV. 1

TITLE _____

PROCEDURE SECTION(S) 8.3.1.2

PROCEDURE CHANGE: (Use reverse side if necessary.)

Implement the following changes to acceptance criteria as per TAC CN002, three places, on Pages 81 and 82

Delete "the distance to end of trails is $1.00 \pm .03$ inches.

Revise "Saddle Travel is $16.00 \pm .03$ inches" to "Saddle travel is $4\frac{3}{4} \pm \frac{1}{4}$ inches"

REASON FOR CHANGE:

TAC CN 002 revises acceptance criteria. Implement the revised acceptance criteria

CLASSIFICATION OF CHANGE

MINOR YES NO

MAJOR YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

<u>Vincent McChapin</u>	<u>7/30/92</u> (1)(2)
TEST ENGINEER	DATE
<u>J. M. Malin</u>	<u>10/6/92</u> (2)
QUALITY ASSURANCE	DATE
<u>J. M. Malin</u>	<u>10/6/92</u> (2)
PROJECT ENGINEER	DATE
<u>Peter J. Juhl</u>	<u>10/6/92</u> (2)
TEST DIRECTOR	DATE

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE

9315-TP-202

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PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 7/31/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) 8.3.6.4, Page 104

PROCEDURE CHANGE: (Use reverse side if necessary.)

Revise 8.3.6.4 acceptance criteria, first bullet, to read: "Video images from camera No. 3 are displayed..." to delete camera #7.

REASON FOR CHANGE:

This test was performed only for camera #3 since camera #7 was not installed at the time. TPCN 16 performs the test for both cameras.

CLASSIFICATION OF CHANGE

MINOR ☐ YES ☐ NO ☐

MAJOR ☐ YES ☒ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

<u>Daniel M. Chapman</u>	<u>7/31/92</u>	(1)(2)
TEST ENGINEER	DATE	
<u>Adm. [Signature]</u>	<u>10/6/92</u>	(2)
QUALITY ASSURANCE	DATE	
<u>F. M. Gallo</u>	<u>10/6/92</u>	(2)
PROJECT ENGINEER	DATE	
<u>Peter [Signature]</u>	<u>10/6/92</u>	(2)
TEST DIRECTOR	DATE	

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 7/31/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) 8.3.1.5, Pages 27 & 28

PROCEDURE CHANGE: (Use reverse side if necessary.)

Revise acceptance criteria From "7.22 ± .03 - .06 inches" to "< 8.15 inches" at 2 places.

REASON FOR CHANGE:

TAC Change Notice 007 revises acceptance criteria to < 8.15 inches.

CLASSIFICATION OF CHANGE

MINOR ☐ YES ☐ NO ☐

MAJOR ☐ YES ☒ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

<u>Daniel Melcham</u>	<u>7/31/92</u> (1)(2)
TEST ENGINEER	DATE
<u>R. M. Mulvaney</u>	<u>10/6/92</u> (2)
QUALITY ASSURANCE	DATE
<u>J. M. Mallo</u>	<u>10/6/92</u> (2)
PROJECT ENGINEER	DATE
<u>Peter J. Hall</u>	<u>10/6/92</u> (2)
TEST DIRECTOR	DATE

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 8/13/92

PROCEDURE NO. TPCN 106 REV. 0 TITLE _____

PROCEDURE SECTION(S) 8.1.2.253

See RL#30

PROCEDURE CHANGE: (Use reverse side if necessary.)

Reverse step 8.1.3.253 to read: "Place the Clamping Table in the HAND Mode and..."

REASON FOR CHANGE:

The specific operating mode does not impact the motor fault alarm function. Hand mode operation, simplifies the performance of the test and saves test time.

CLASSIFICATION OF CHANGE

MINOR YES NO

MAJOR YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

The TAC test entry specifies single mode operations but this has no impact on the acceptance criteria.

*TPC 9/14/92
To be voided because of wording of
acceptance criteria which requires
return to "Single" mode. This TPC
was improperly prepared.*

Virgil M. Chapman 8/13/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 01/18/92

PROCEDURE NO. TPCN 10 REV. 1 TITLE _____

PROCEDURE SECTION(S) N/A

RL #35

PROCEDURE CHANGE: (Use reverse side if necessary.)

Where required to go to the UP position, use the restore process when operating in the hand mode.

REASON FOR CHANGE:

Clarification

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☐ NO ☐

MAJOR ☐ YES ☐ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

W. J. McLean 01/18/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 01/19/92

PROCEDURE NO. TPCN 10 REV. 0 TITLE _____

PROCEDURE SECTION(S) see below TPCN 10 ONLY

PROCEDURE CHANGE: (Use reverse side if necessary.)

Delete steps related to repeated recording of clamping table elevation indications on the process control system in TPCN 10 testing only.

Revert 01/17/92 Page 16-18, Step 0.1.3.34, 37, 40
Steps 0.1.3.72, 75, 78, 81, 86, 89, 92, 95, 101, 104, 107, 110

REASON FOR CHANGE:

The process control system operates to the setpoint elevations and no variation in readings is possible without a false fault condition being alarmed.

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☐ NO ☐

MAJOR ☐ YES ☐ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

D. J. M. Chan 01/19/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for minor changes
(2) Required for major changes

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/14/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) TPCN 10 Steps 8.1.3.117 to 39

PROCEDURE CHANGE: (Use reverse side if necessary.)

Revise the handling of W17 x 17 as per the attached markup (TPCN 10 Pages 32 to 40)

Also, redefine Steel position to "1" feet of the inside lip on the East of the Clamping Table" to clarify setup position. Step 8.1.3.130 and note above.

Also, make other minor corrections.

REASON FOR CHANGE:

Project Management does not wish to demonstrate Downender to Clamping Table transfers. Also, to update for new information.

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☐ NO

MAJOR ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

W. M. Phomm 9/14/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

Notes: (1) Required for minor changes
(2) Required for major changes

Westinghouse 17 X 17 Testing

8.1.3.117 Ensure that the Accountability System indicates NO fuel on the ~~Downender~~, RBT, or Clamping Table.
Cutting Table

TPCN 22
v. 2
9/14/92

8.1.3.118 Drive Lower Clamp Slide M-106B to the FWD position.

8.1.3.119 Drive Upper Clamp Slide M-106A to the FWD position.

WARNING

All personnel must be clear of the test area during hand mode operations of the RBT.

NOTE

Downender and RBT operations may be performed as per DOP-005 and DOP-017 as a guide. These actual operations are transparent to this test procedure.

8.1.3.120 Place the first W 17 X 17 mock-up fuel assembly in the ~~Downender in a vertical position with the Downender's Bottom Support M-103B at fuel-specific raised setpoint~~ on the Cutting Table in position for cutting. Note the position in the test log.

TPCN 22
v. 2
9/14/92

8.1.3.121 Verify that the fuel assembly serial number is displayed on the ~~Downender~~ control screen.
a Cutting System

TPCN 22
v. 2
9/14/92

~~8.1.3.122 Lower the first fuel assembly to the Downender's cradle and raise the Downender carriage.~~

CAUTION

Test Log entry 0730 on 6/5/92 indicated that the fuel could not be loaded unless the lower clamp slide was back. This test seeks to resolve this issue.

8.1.3.122 Perform the restore process for the Red Extraction System. This will raise the Clamping Table, position the slider, and open the clamps. Record the indicated slide positions.

TPCN 22
v. 2
9/14/92

Upper Clamp Slide: _____
Lower Clamp Slide: _____

NOTE

Place plywood supports on the Clamping Table as required to support the mockup fuel assemblies at the gricks.

CAUTION

Loading the complete Westinghouse 17 X 17 fuel assembly to the Clamping Table will result in contact interference with the Rod Extraction System. Be prepared to use the HALT or Emergency Stop functions as the assembly is lowered. RBT operations are then to be performed in the JOG mode to safely position the assemblies in the Clamping Table. The JOG mode offsets used are to be recorded.

8.1.3.123 Operating the RBT with PWR FAHF in the HAND mode, transfer a Westinghouse 17 X 17 mock-up fuel assembly from the ~~Downender cradle~~ to the North Clamping Table position. *Cutting Table*

TPCN # 27
vve
9/14/92

8.1.3.124 As the RBT is lowering the complete W 17 X 17 fuel assembly, actuate HALT on the RBT control screen.

8.1.3.125 Record the RBT's position indications.

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

8.1.3.126 Place the RBT in the JOG Mode to continue placement of the assembly on the Clamping Table. Move the bridge South as required to obtain the minimum fuel assembly clearance with the Rod Extraction System. *If required, position the lower clamp slide for clearance. Note the final position. Lower Clamp Slide: _____*

TPCN # 22
vve
9/14/92

8.1.3.127 WHEN the fuel assembly is in position, THEN record the RBT's position indications.

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

8.1.3.128 Calculate the required Bridge offset to load a complete W 17 X 17 assembly to the table.

BRIDGE OFFSET: _____

- 8.1.3.129 Verify that Trolley position was correct for fuel assembly placement.

Test Conductor _____

Date _____

NOTE

The ends ^{East} of the fuel rods, after end fitting removal, are expected to be one inch ~~West~~ of the East End of the Clamping Table. ^{inside of the lip on the}

TPCN #22
9/11/92

- 8.1.3.130 Record the distance of the East end of the fuel rods from the East end of the Clamping Table.

^{inside of the lip on the}

Measured Distance: _____ " East

Less Bridge Offset: _____

Effective Distance: _____

TPCN #27
9/11/92

NOTE

Editing of the Accountability System for fuel assembly transfer in the JOG mode may be required to indicate the fuel assembly serial numbers on the PWR Clamping Table control screen.

8.1.3.131 Acceptance Criteria

- . The mockup fuel assembly was successfully placed by the RBT in the North Clamping Table position.
- . The PWR Clamping Table control screen indicates that a fuel assembly is present at the SERIAL 1 location.

Test Conductor _____

Date _____

QA _____

Date _____

- 8.1.3.132 Move the RBT clear of the Clamping Table and perform the restore process. ^{Center RBT}

TPCN #22
9/11/92

- 8.1.3.133 Observe clamp alignment with the fuel assembly.

NOTE

Use jog-mode offset to evaluate the centerline positions.

8.1.3.134 Acceptance Criteria

- . Centerline of the lower clamps align with the lower end fitting of the mock-up fuel assembly.
- . Centerline of the upper clamps align with the upper grid of the mock-up fuel assembly.
- . Centerline of the intermediate saddles align with grids.

Test Conductor

Date

QA

Date

Second W 17 X 17 Fuel Assembly

- 8.1.3.135 Place the second W 17 X 17 mock-up fuel assembly in the Downender in a vertical position with the Downender's Bottom Support M-103B at fuel-specific raised setpoint. *on the Cutting Table in position for cutting. Note the assembly's position into test lug.*
- 8.1.3.136 Verify that the fuel assembly serial number is displayed on the Downender control screen. *a Cutting System*
- ~~8.1.3.137 Lower the second fuel assembly to the Downender's cradle and raise the Downender carriage.~~

TPCN 10
n
911492TPCN 10
n
911492**CAUTION**

Loading the complete Westinghouse 17 X 17 fuel assembly to the Clamping Table will result in contact interference with the Rod Extraction System. Be prepared to use the HALT or Emergency Stop functions as the assembly is lowered. RBT operations are then to be performed in the JOG mode to safely position the assemblies in the Clamping Table. The JOG mode offsets used are to be recorded.

- 8.1.3.138 Operating the RBT with PWR FAHF in the HAND mode, transfer the second Westinghouse 17 X 17 mock-up fuel assembly from the Downender cradle to the South Clamping Table position.
- 8.1.3.139 As the RBT is lowering the complete W 17 X 17 fuel assembly, actuate HALT on the RBT control screen.
- 8.1.3.140 Record the RBT's position indications.

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

NOTE

Monitor the loading of the second assembly for clearance of the FAHF from the first assembly.

8.1.3.141 Place the RBT in the JOG Mode to continue placement of the assembly on the Clamping Table. Move the bridge South as required to obtain the minimum fuel assembly clearance with the Rod Extraction System

8.1.3.142 WHEN the fuel assembly is in position, THEN record the RBT's position indications.

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

8.1.3.143 As the Fuel Assembly Handling Fixture Clamp M-121G is opened, obtain (with a tape measure) and record the clearance between the North face of the clamp and the W 17 X 17 fuel assembly in the North position on the Clamping Table. (For information only.)

FAHF/W 17 X 17 Clearance: _____

8.1.3.144 Calculate the required Bridge offset to load a complete W 17 X 17 assembly to the table.

BRIDGE OFFSET: _____

8.1.3.145 Verify that Trolley position was correct for fuel assembly placement.

Test Conductor

Date

NOTE

Editing of the Accountability System for fuel assembly transfer in the JOG mode may be required to indicate the fuel assembly serial numbers on the PWR Clamping Table control screen.

8.1.3.146 Acceptance Criteria

- . The mockup fuel assembly was successfully placed in the South Clamping Table position.
- . The PWR Clamping Table control screen indicates that a fuel assembly is present at the SERIAL 2 location.

Test Conductor	Date
----------------	------

QA	Date
----	------

NOTE

This closes Exception/Repair Log # 15.

8.1.3.147 Move the RBT clear of the Clamping Table.

8.1.3.148 Observe clamp alignment with the fuel assembly.

NOTE

Use jog-mode offset to evaluate the centerline positions.

8.1.3.149 Acceptance Criteria

- . Centerline of the lower clamps align with the lower end fitting of the mock-up fuel assembly.
- . Centerline of the upper clamps align with the upper grid of the mock-up fuel assembly.
- . Centerline of the intermediate saddles align with grids.

Test Conductor	Date
----------------	------

QA	Date
----	------

Clamp Closure Demonstration**NOTE**

IF the fuel assembly offset does not allow for clamp alignment with the lower end fitting or upper grids, THEN do NOT close the clamps on the mock-up fuel assembly. Perform this testing later on a test rig which matches W 17 X 17 cross-sectional dimensions and explain in the Daily Test Log. In Sequence: — or Deferred: —

TPCN #21
v. 1
9/14/92

8.1.3.150 Close Lower Clamp 1 M-106C and Lower Clamp 2 M-106D.

8.1.3.151 Record the Lower Clamp position indications:

LOWER CLAMP 1 M-106C: _____

LOWER CLAMP 2 M-106D: _____

8.1.3.152 Acceptance Criteria

Lower clamps grip fuel assembly end fittings.

Test Conductor

Date

QA

Date

8.1.3.153 Close Upper Clamp 1 M-106E2 and Upper Clamp 2 M-106G2.

8.1.3.154 Record the Upper Clamp position indications:

UPPER CLAMP 1 M-106E2: _____

UPPER CLAMP 2 M-106G2: _____

8.1.3.155 Acceptance Criteria

Upper clamp bars rotate and press down on the fuel assembly grids.

Test Conductor

Date

QA

Date

NOTE

This closes the issues raised by TPCN 7.

8.1.3.156 Open all clamps on the clamping table.

8.1.3.157 Acceptance Criteria

Clamps open.

Test Conductor

Date

QA

Date

TEST PROCEDURE

9315-TP-202

REVISION

1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/21/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) TPCN 10 Steps 8.1.3.117 to 8.1.3.157 (see attached)

PROCEDURE CHANGE: (Use reverse side if necessary.)

- 1/ Revise TPCN 10 to delete RBT Hand mode operations as per the attached mark-up.
- 2/ Revise TPCN 10 to delete clamping operations on fuel as per the attached mark-up.
- 3/ Correct Fuel position setpoint to "1" foot of the inside lip on the East end of the Clamping Table".

REASON FOR CHANGE:

1. Management has decided to delete RBT positioning verification in verification of clamp alignment. Clamp alignment to be measured and corrected for ideal positioning setpoint.
2. Clamp closure on fuel should not be performed due to required offset forward fitting. Simulation is not required since clamp operations are verified previously.
2. Correct incorrect instruction.

CLASSIFICATION OF CHANGE

MINOR YES NO

MAJOR ✓ YES NO

REVISION TO ORIGINAL PROCEDURE REQUIRED YES NO

APPROVALS

<u>David M. Chapman</u>	<u>9/21/92</u>	(1)(2)
TEST ENGINEER	DATE	
<u>W. J. Mulgrew</u>	<u>9/21/92</u>	(2)
QUALITY ASSURANCE	DATE	
<u>Paul J. F. G. Galt</u>	<u>9/21/92</u>	(2)
PROJECT ENGINEER	DATE	
<u>Peter J. Galt</u>	<u>9/21/92</u>	(2)
TEST DIRECTOR	DATE	

Notes: (1) Required for minor changes
(2) Required for major changes

Westinghouse 17 X 17 Testing

8.1.3.117 Ensure that the Accountability System indicates NO fuel on the Downender, RBT, or Clamping Table. *unc*

8.1.3.118 ~~Drive Lower Clamp Slide M-106B to the FWD position.~~ *Initialize the system for W17x17 Fuel. unc*

8.1.3.119 ~~Drive Upper Clamp Slide M-106A to the FWD position.~~

TPCN 27
unc
9/14/92

WARNING

All personnel must be clear of the test area during ~~hand mode~~ operations of the RBT.

TPCN 27
unc
9/14/92

~~NOTE~~

~~Downender and RBT operations may be performed as per DOP 005 and DOP 017 as a guide. These actual operations are transparent to this test procedure.~~

~~8.1.3.120 Place the first W 17 X 17 mock-up fuel assembly in the Downender in a vertical position with the Downender's Bottom Support M-103B at fuel-specific raised setpoint.~~

~~8.1.3.121 Verify that the fuel assembly serial number is displayed on the Downender control screen.~~

~~8.1.3.122 Lower the first fuel assembly to the Downender's cradle and raise the Downender carriage.~~

CAUTION

Test Log entry 0730 on 6/5/92 indicated that the fuel could not be loaded unless the lower clamp slide was back. This test seeks to resolve this issue.

CAUTION

~~Loading the complete Westinghouse 17 X 17 fuel assembly to the Clamping Table will result in contact interference with the Rod Extraction System. Be prepared to use the HALT or Emergency Stop functions as the assembly is lowered. RBT operations are then to be performed in the JOG mode to safely position the assemblies in the Clamping Table. The JOG mode offsets used are to be recorded.~~

TRN 2
VFC
9/21/92

TRN 23
VFC
9/21/92

TRN 23 VFC
9/21/92
TRN 23 VFC
9/21/92

121040
9/22/92
8.1.3.123 Operating the RBT with PWR FAHF in the ^{JOG}~~HAND~~ mode, transfer a Westinghouse 17 X 17 mock-up fuel assembly ~~from the Downender cradle~~ to the North Clamping Table position.

~~8.1.3.124 As the RBT is lowering the complete W 17 X 17 fuel assembly, actuate HALT on the RBT control screen~~

8.1.3.125 Record the RBT's position indications.

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

~~8.1.3.126 Place the RBT in the JOG Mode to continue placement of the assembly on the Clamping Table. Move the bridge South as required to obtain the minimum fuel assembly clearance with the Rod Extraction System.~~

~~8.1.3.127 WHEN the fuel assembly is in position, THEN record the RBT's position indications.~~

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

8.1.3.128 Calculate the required Bridge offset to load a complete W 17 X 17 assembly to the table.

BRIDGE OFFSET: _____

TRN 23
VFC
9/21/92

TRN 23
VFC
9/21/92

~~8.1.3.130 Verify that Trolley position was correct for fuel assembly placement.~~

~~Test Conductor~~

~~Date~~

NOTE

The ends of the fuel rods, after end fitting removal, are expected to be one inch ~~West~~ of the East End of the Clamping Table. ^{East} (inside of the lip on the

TPCN 23
vnc
9/21/92

TPCN 23
vnc
9/21/92

TPCN 23
vnc
9/21/92

~~8.1.3.130 Record the distance of the East end of the fuel rods from the East end of the Clamping Table.~~

~~Measured Distance:~~

~~Less Bridge Offset:~~

~~Effective Distance:~~

NOTE

Editing of the Accountability System for fuel assembly transfer in the JOG mode may be required to indicate the fuel assembly serial numbers on the PWR Clamping Table control screen.

8.1.3.131 Acceptance Criteria

RLH40
9/21/92

RLH40
9/21/92
RLH41
9/21/92

The mockup fuel assembly was successfully placed by the RBT in the North Clamping Table position.
W. M. Chapman 9/22/92 *W. M. Chapman 9/22/92*

The PWR Clamping Table control screen indicates that a fuel assembly is present at the SERIAL 1 location.

W. M. Chapman 9/22/92
Test Conductor Date

W. M. Chapman 9/22/92
QA Date

~~8.1.3.132 Move the RBT clear of the Clamping Table and perform the restore process.~~

8.1.3.133 Observe clamp alignment with the fuel assembly.

TPCN 23
vnc
9/21/92

TPCN 27
VAC
9/21/92

8.1.3.134 Acceptance Criteria

RLH40
✓
9/21/92

- . Centerline of the lower clamps align with the lower end fitting of the mock-up fuel assembly.
- . Centerline of the upper clamps align with the upper grid of the mock-up fuel assembly.
- . Centerline of the intermediate saddles align with grids.

William J. O'Connell
Test Conductor

9/22/92
Date

Thomas F. Mulvey
QA

9/22/92
Date

Second W 17 X 17 Fuel Assembly

- ~~8.1.3.135 Place the second W 17 X 17 mock-up fuel assembly in the Downender in a vertical position with the Downender's Bottom Support M-103B at fuel-specific raised setpoint.~~
- ~~8.1.3.136 Verify that the fuel assembly serial number is displayed on the Downender control screen.~~
- ~~8.1.3.137 Lower the second fuel assembly to the Downender's cradle and raise the Downender carriage.~~

CAUTION

~~Loading the complete Westinghouse 17 X 17 fuel assembly to the Clamping Table will result in contact interference with the Rod Extraction System. Be prepared to use the HALT or Emergency Stop functions as the assembly is lowered. RBT operations are then to be performed in the JOG mode to safely position the assemblies in the Clamping Table. The JOG mode offsets used are to be recorded.~~

- ~~8.1.3.138 Operating the RBT with PWR FAHF in the ^{JOG} ~~HAND~~ mode, transfer the second Westinghouse 17 X 17 mock-up fuel assembly ~~from the Downender cradle~~ to the South Clamping Table position.~~

- ~~8.1.3.139 As the RBT is lowering the complete W 17 X 17 fuel assembly, actuate HALT on the RBT control screen.~~

- ~~8.1.3.140 Record the RBT's position indications.~~

~~BRIDGE M-121A1/2: _____~~

~~TROLLEY M-121B1/2: _____~~

~~TUBE M-121C1/2: _____~~

NOTE

~~Monitor the loading of the second assembly for clearance of the FAHF from the first assembly.~~

~~8.1.3.141 Place the RBT in the JOG Mode to continue placement of the assembly on the Clamping Table. Move the bridge South as required to obtain the minimum fuel assembly clearance with the Rod Extraction System.~~

TPCN 23
vrc
9/21/12

~~8.1.3.142 WHEN the fuel assembly is in position, THEN record the RBT's position indications.~~

BRIDGE M-121A1/2: _____

TROLLEY M-121B1/2: _____

TUBE M-121C1/2: _____

~~8.1.3.143 As the Fuel Assembly Handling Fixture Clamp M-121G is opened, obtain (with a tape measure) and record the clearance between the North face of the clamp and the W 17 X 17 fuel assembly in the North position on the Clamping Table. (For information only.)~~

FAHF/W 17 X 17 Clearance: _____

~~8.1.3.144 Calculate the required Bridge offset to load a complete W 17 X 17 assembly to the table.~~

BRIDGE OFFSET: _____

~~8.1.3.145 Verify that Trolley position was correct for fuel assembly placement.~~

Test Conductor _____

Date _____

NOTE

Editing of the Accountability System for fuel assembly transfer in the JOG mode may be required to indicate the fuel assembly serial numbers on the PWR Clamping Table control screen.

8.1.3.146 Acceptance Criteria

- The mockup fuel assembly was successfully placed in the South Clamping Table position.
- The PWR Clamping Table control screen indicates that a fuel assembly is present at the SERIAL 2 location.

 Test Conductor Date

 QA Date

NOTE

This closes Exception/Repair Log # 15.

8.1.3.147 Move the RBT clear of the Clamping Table.

8.1.3.148 Observe clamp alignment with the fuel assembly.

NOTES

~~Use jog-mode offset to evaluate the centerline positions.~~

TRCN 23
VTC
9/21/92

8.1.3.149 Acceptance Criteria

- . Centerline of the lower clamps align with the lower end fitting of the mock-up fuel assembly.
- . Centerline of the upper clamps align with the upper grid of the mock-up fuel assembly.
- . Centerline of the intermediate saddles align with grids.

David Melton 9/22/92
 Test Conductor Date
[Signature] 9/22/92
 QA Date

Clamp Closure Demonstration

TPCW 23
VRE
9/11/92

NOTE

IF the fuel assembly offset does not allow for clamp alignment with the lower end fitting or upper grids, THEN do NOT close the clamps on the mock-up fuel assembly. Perform this testing later on a test rig which matches W 17 X 17 cross-sectional dimensions and explain in the Daily Test Log.

8.1.3.150 Close Lower Clamp 1 M-106C and Lower Clamp 2 M-106D.

8.1.3.151 Record the Lower Clamp position indications:

LOWER CLAMP 1 M-106C: _____

LOWER CLAMP 2 M-106D: _____

8.1.3.152 Acceptance Criteria

Lower clamps grip fuel assembly end fittings.

Test Conductor Date

QA Date

8.1.3.153 Close Upper Clamp 1 M-106E2 and Upper Clamp 2 M-106G2.

8.1.3.154 Record the Upper Clamp position indications:

UPPER CLAMP 1 M-106E2: _____

UPPER CLAMP 2 M-106G2: _____

8.1.3.155 Acceptance Criteria

Upper clamp bars rotate and press down on the fuel assembly grids.

Test Conductor Date

QA Date

NOTE

This closes the issues raised by TPCN 7.

8.1.3.156 Open all clamps on the clamping table.

8.1.3.157 Acceptance Criteria

Clamps open.

Test Conductor

Date

QA

Date

TPCN 23
VAC
9/21/92

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/24/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) TPCN 10 Steps 8.1.3.158 to 252

Reference RLH 42-44

PROCEDURE CHANGE: (Use reverse side if necessary.)

Re-test as per the attached procedure to resolve Exception RL#42.

REASON FOR CHANGE:

Unable to demonstrate alignment due to pull head gripper level.

CLASSIFICATION OF CHANGE

MINOR ☐ YES ☐ NO ☐

MAJOR ☒ YES ☐ NO ☐

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

David M. Ch... 9/24/92 (1)(2)
TEST ENGINEER DATE

[Signature] 9/24/92 (2)
QUALITY ASSURANCE DATE

[Signature] 9/24/92 (2)
PROJECT ENGINEER DATE

[Signature] 9/24/92 (2)
TEST DIRECTOR DATE

Notes: (1) Required for minor changes
(2) Required for major changes

ROD ALIGNMENT VERIFICATION**NOTE**

This testing performs a functional verification of rod alignment on the Clamping Table with the Rod Extraction pull heads. This testing superceeds Steps 8.1.3.158 to 8.1.3.252 of TPCN 10 for 9315-TP-202. In attempting to set up for testing as per TPCN 10, some problems were identified. See Exception/Repair Logs 42, 43, & 44.

The pull head grippers do not hold the test rod level. The test rod is pointed down. This angle is sufficient, over the test rod length, to produce alignment error in excess of 0.010 inches. Consequently, the long test rod in the hole test will not work if the table setpoints and alignment gauge are set for W 17 x 17 fuel assemblies.

The existing elevation setpoints appear to require some modification to accurately align with W 17 X 17 fuel rods.

8.1.3.158 Place two Westinghouse 17 X 17 fuel assemblies on the Clamping Table in a position sufficiently West to accommodate the alignment gauge.

8.1.3.159 Verify that the Clamping Table homes to the same point ($\pm 1/16$ inch) repeatedly.

- . Home three times recording table elevation measurements at the SW corner using a tape measure.
- . Observe for any drift down at the end of the homing sequence. None observed ~
- . Record any observations in the test log.

Elevation: 1124.5 mm

Elevation: ~~1186.0 mm~~ 1124.5 mm ^{1/24/92 eyeball error}

Elevation: 1124.5 mm

Verified By David M. [Signature]

7/24/92

Date

PULL HEAD M-107A VERTICAL ALIGNMENT VERIFICATION

8.1.3.160 Set up the alignment gage and test rods to demonstrate Clamping Table elevation alignment at programmed setpoints with the Rod Extraction Pull Head grippers. Establish new elevation setpoints as required.

- Use the Alignment gauge described in TPCN 8 with longer threaded rods so that the grippers may reach the test rods when the Upper Clamp Slide is positioned near it's end of travel East.
- Shim the alignment gauge vertically .020" to reflect an average W 17 X 17 grid thickness. Shim the gauge horizontally to obtain N/S alignment.
- Operate in the jog mode as required to position the alignment gage.
- Using short test rods in the grippers, set elevation setpoints to obtain alignment between opposing rods (one time only M-107A or M-107B).
- Record the revised elevation setpoints (one time only M-107A or M-107B).

ROW 1: <u>3.109"</u> = 39440 cts	ROW 2: _____	* Incremental moves of about 0.488 inches x $\left(\frac{11.117 - 3300}{16}\right)$ See steps 8.1.3.162 to 8.1.3.22 for undercarriage
ROW 3: _____	ROW 4: _____	
ROW 5: _____	ROW 6: _____	
ROW 7: _____	ROW 8: _____	
ROW 9: _____	ROW 10: _____	
ROW 11: _____	ROW 12: _____	
ROW 13: _____	ROW 14: _____	
ROW 15: _____	ROW 16: _____	
ROW 17: _____		

- Remove the test rods from the grippers and leave the jaws open.
- Restore the system Clamping Table after setup is established.
- Place the Rod Extraction System in the HAND Mode.

 *
 * **CAUTION** *
 *
 * If at any time the Clamping Table Elevation
 * motor M-106I is removed from the HAND mode
 * of operations at rows 2 through 17, then
 * return to the Row 1 elevation and index back
 * to the required setpoint elevation. This will
 * re-establish the starting point for the
 * incremental moves.

NOTE

Elevations and elevation indications should be recorded for either M-107A or M-107B. It is not required to duplicate the recorded information.

Rod Row 1 Alignment

8.1.3.161 Position the Clamping Table at Row 1.

8.1.3.162 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I:

3.109
1264.5 mm ~ 9/24/92

8.1.3.163 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation:

1264.5 mm
1265.0 mm ~ 9/24/92

8.1.3.164 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.165 Verify that the grippers were able to reach the rods in Row 1 without interference.

David M. Craper
 Test Conductor

9/24/92
 Date

8.1.3.166 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.167 Remove the rods in Row 1 of the alignment gauge.

7
 1/15/92
 10/22
 5/1/92
 Setup

Rod Row 2 Alignment

8.1.3.168 Position the Clamping Table at Row 2.

8.1.3.169 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 3.598

8.1.3.170 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1277.0mm
1278.0mm - 9/22/92

8.1.3.171 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.172 Verify that the grippers were able to reach the rods in Row 2 without interference.

Wing M. Chap 9/24/92
Test Conductor Date

8.1.3.173 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.174 Remove the rod in Row 2 of the alignment gauge.

Rod Row 3 Alignment

8.1.3.175 Position the Clamping Table at Row 3.

8.1.3.176 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 4.087

8.1.3.177 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1290.0mm
1290.5mm - 9/22/92

8.1.3.178 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.178 Verify that the grippers were able to reach the rods in Row 3 without interference.

Wing M. Chap 9/24/92
Test Conductor Date

8.1.3.180 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.181 Remove the rod in Row 3 of the alignment gauge.

Rod Row 4 Alignment

8.1.3.182 Position the Clamping Table at Row 4.

8.1.3.183 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 4.576

8.1.3.184 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation:

1307.0 mm ^{9/29/92 subtraction error}
1307.0 mm ^{9/29/92}

8.1.3.185 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.186 Verify that the grippers were able to reach the rods in Row 4 without interference.

David M. Chapman 9/24/92
Test Conductor Date

8.1.3.187 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.188 Remove the rod in Row 4 of the alignment gauge. ^{9/24/92}

Rod Row 5 Alignment

8.1.3.189 Position the Clamping Table at Row 5. ^{9/26/92}

8.1.3.190 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 5.065"

8.1.3.191 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1315.5 mm

8.1.3.192 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.193 Verify that the grippers were able to reach the rods in Row 5 without interference.

David M. Chapman 9/26/92
Test Conductor Date

8.1.3.194 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.195 Remove the rod in Row 5 of the alignment gauge.

Rod Row 6 Alignment

8.1.3.196 Position the Clamping Table at Row 6.

8.1.3.197 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 5.555"

8.1.3.198 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1329.0mm

8.1.3.199 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.200 Verify that the grippers were able to reach the rods in Row 6 without interference.

W. J. M. Elia 9/28/92
Test Conductor Date

8.1.3.201 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.202 Remove the rod in Row 6 of the alignment gauge.

Rod Row 7 Alignment

8.1.3.203 Position the Clamping Table at Row 7.

8.1.3.204 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 6.044"

8.1.3.205 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1340.5mm

8.1.3.206 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.207 Verify that the grippers were able to reach the rods in Row 7 without interference.

W. J. M. Elia 9/28/92
Test Conductor Date

8.1.3.208 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.209 Remove the rod in Row 7 of the alignment gauge.

Rod Row 8 Alignment

8.1.3.210 Position the Clamping Table at Row 8.

8.1.3.211 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 6.533"

8.1.3.212 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1353.5mm

8.1.3.213 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.214 Verify that the grippers were able to reach the rods in Row 8 without interference.

W. J. M. Chap 9/28/92
Test Conductor Date

8.1.3.215 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.216 Remove the rod in Row 8 of the alignment gauge.

Rod Row 9 Alignment

8.1.3.217 Position the Clamping Table at Row 9.

8.1.3.218 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 7.022"

8.1.3.219 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1365.0mm

8.1.3.220 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.221 Verify that the grippers were able to reach the rods in Row 9 without interference.

W. J. M. Chap 9/28/92
Test Conductor Date

8.1.3.222 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.223 Remove the rod in Row 9 of the alignment gauge.

Rod Row 10 Alignment

8.1.3.224 Position the Clamping Table at Row 10.

8.1.3.225 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 7.511"

8.1.3.226 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1378.5 mm

8.1.3.227 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.228 Verify that the grippers were able to reach the rods in Row 11 without interference.

David M. Chen 9/28/92
Test Conductor Date

8.1.3.229 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.230 Remove the rod in Row 10 of the alignment gauge.

Rod Row 11 Alignment

8.1.3.231 Position the Clamping Table at Row 11.

8.1.3.232 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 8.000"

8.1.3.233 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1391.5 mm

8.1.3.234 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.235 Verify that the grippers were able to reach the rods in Row 11 without interference.

David M. Chen 9/28/92
Test Conductor Date

8.1.3.236 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.237 Remove the rod in Row 11 of the alignment gauge.

Rod Row 12 Alignment

8.1.3.238 Position the Clamping Table at Row 12.

8.1.3.239 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 8.482"

8.1.3.240 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1463.5mm

8.1.3.241 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.242 Verify that the grippers were able to reach the rods in Row 12 without interference.

David M. Chen 9/28/92
Test Conductor Date

8.1.3.243 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.244 Remove the rod in Row 12 of the alignment gauge.

Rod Row 13 Alignment

8.1.3.245 Position the Clamping Table at Row 13.

8.1.3.246 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 8.471"

8.1.3.247 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1417.0mm

8.1.3.248 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.249 Verify that the grippers were able to reach the rods in Row 13 without interference.

David M. Chen 9/28/92
Test Conductor Date

8.1.3.250 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.251 Remove the rod in Row 13 of the alignment gauge.

Rod Row 14 Alignment

8.1.3.252 Position the Clamping Table at Row 14.

8.1.3.x01 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 9.460"

8.1.3.x02 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 14295mm

8.1.3.x03 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x04 Verify that the grippers were able to reach the rods in Row 14 without interference.

Daniel M. Chan 9/28/92
Test Conductor Date

8.1.3.x05 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.x06 Remove the rod in Row 14 of the alignment gauge.

Rod Row 15 Alignment

8.1.3.x07 Position the Clamping Table at Row 15.

8.1.3.x08 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 9.949"

8.1.3.x09 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1442.0mm

8.1.3.x10 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x11 Verify that the grippers were able to reach the rods in Row 15 without interference.

Daniel M. Chan 9/28/92
Test Conductor Date

8.1.3.x12 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.x13 Remove the rod in Row 15 of the alignment gauge.

Rod Row 16 Alignment

8.1.3.x14 Position the Clamping Table at Row 16.

8.1.3.x15 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 10.438"

8.1.3.x16 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1455.0 mm

8.1.3.x17 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x18 Verify that the grippers were able to reach the rods in Row 16 without interference.

David M. Cha 9/28/92
Test Conductor Date

8.1.3.x19 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.x20 Remove the rod in Row 16 of the alignment gauge.

Rod Row 17 Alignment

8.1.3.x21 Position the Clamping Table at Row 17.

8.1.3.x22 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: 10.928"

8.1.3.x23 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: 1468.0 mm

8.1.3.x24 Extend Pull Head Drive M-107A forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x25 Verify that the grippers were able to reach the rods in Row 17 without interference.

David M. Cha 9/28/92
Test Conductor Date

8.1.3.x26 Retract Pull Head Drive M-107A to a hold point position.

8.1.3.x27 Remove the rod in Row 17 of the alignment gauge.

PULL HEAD M-107B VERTICAL ALIGNMENT VERIFICATION

8.1.3.x28 Set up the alignment gage and test rods to demonstrate Clamping Table elevation alignment at programmed setpoints with the Rod Extraction Pull Head grippers. Establish new elevation setpoints as required.

- . Use the Alignment gauge described in TPCN 8 with longer threaded rods so that the grippers may reach the test rods when the Upper Clamp Slide is positioned near it's end of travel East.
- . Shim the alignment gauge vertically .020" to reflect an average W 17 X 17 grid thickness. Shim the gauge horizontally to obtain N/S alignment.
- . Operate in the jog mode as required to position the alignment gage.
- . Using short test rods in the grippers, set elevation setpoints to obtain alignment between opposing rods (one time only M-107A or M-107B).
- . Record the revised elevation setpoints (one time only M-107A or M-107B).

ROW 1: <u>✓ 1078 911 912</u>	ROW 2: <u>✓ 1078 911 912</u>
ROW 3: <u>✓</u>	ROW 4: <u>✓</u>
ROW 5: <u>✓</u>	ROW 6: <u>✓</u>
ROW 7: <u>✓</u>	ROW 8: <u>✓</u>
ROW 9: <u>✓</u>	ROW 10: <u>✓</u>
ROW 11: <u>✓</u>	ROW 12: <u>✓</u>
ROW 13: <u>✓</u>	ROW 14: <u>✓</u>
ROW 15: <u>✓</u>	ROW 16: <u>✓</u>
ROW 17: <u>✓</u>	

- . Remove the test rods from the grippers and leave the jaws open.
- . Restore the system Clamping Table after setup is established.
- . Place the Rod Extraction System in the HAND Mode.

*
* CAUTION *
*
* If at any time the Clamping Table Elevation
* motor M-106I is removed from the HAND mode
* of operations at rows 2 through 17, then
* return to the Row 1 elevation and index back
* to the required setpoint elevation. This will
* re-establish the starting point for the
* incremental moves.

NOTE

Elevations and elevation indications should be recorded for either M-107A or M-107B. It is not required to duplicate the recorded information.

Rod Row 1 Alignment

8.1.3.x29 Position the Clamping Table at Row 1.

8.1.3.x30 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A M-107B (typical) 9/19/92

8.1.3.x31 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A M-107B (typical) 9/19/92

8.1.3.x32 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x33 Verify that the grippers were able to reach the rods in Row 1 without interference.

David J. Elmer 9/28/92
Test Conductor Date

8.1.3.x34 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.x35 Remove the rods in Row 1 of the alignment gauge.

Rod Row 2 Alignment

8.1.3.x36 Position the Clamping Table at Row 2.

8.1.3.x37 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I:

N/A 9/29/92

8.1.3.x38 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation:

N/A 9/29/92

8.1.3.x39 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x40 Verify that the grippers were able to reach the rods in Row 2 without interference.

William M. Chan
Test Conductor

9/29/92
Date

8.1.3.x41 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.x42 Remove the rod in Row 2 of the alignment gauge.

Rod Row 3 Alignment

8.1.3.x43 Position the Clamping Table at Row 3.

8.1.3.x44 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I:

N/A 9/29/92

8.1.3.x45 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation:

N/A 9/29/92

8.1.3.x46 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x47 Verify that the grippers were able to reach the rods in Row 3 without interference.

William M. Chan
Test Conductor

9/29/92
Date

8.1.3.x48 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.x49 Remove the rod in Row 3 of the alignment gauge.

Rod Row 4 Alignment

8.1.3.x50 Position the Clamping Table at Row 4.

8.1.3.x51 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I:

N/A 9/28/92

8.1.3.x52 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation:

N/A 9/28/92

8.1.3.x53 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x54 Verify that the grippers were able to reach the rods in Row 4 without interference.

David M. Chen
Test Conductor

9/28/92
Date

8.1.3.x55 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.x56 Remove the rod in Row 4 of the alignment gauge.

Rod Row 5 Alignment

8.1.3.x57 Position the Clamping Table at Row 5.

8.1.3.x58 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I:

N/A 9/28/92

8.1.3.x59 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation:

N/A 9/28/92

8.1.3.x60 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x61 Verify that the grippers were able to reach the rods in Row 5 without interference.

David M. Chen
Test Conductor

9/28/92
Date

8.1.3.x62 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.x63 Remove the rod in Row 5 of the alignment gauge.

7 of 7

Rod Row 6 Alignment

8.1.3.x64 Position the Clamping Table at Row 6.

8.1.3.x65 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 8/24/92

8.1.3.x66 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 8/24/92

8.1.3.x67 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x68 Verify that the grippers were able to reach the rods in Row 6 without interference.

Wesley M. Elmer 9/28/92
Test Conductor Date

8.1.3.x69 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.x70 Remove the rod in Row 6 of the alignment gauge.

Rod Row 7 Alignment

8.1.3.x71 Position the Clamping Table at Row 7.

8.1.3.x72 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 8/24/92

8.1.3.x73 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 8/24/92

8.1.3.x74 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x75 Verify that the grippers were able to reach the rods in Row 7 without interference.

Wesley M. Elmer 9/29/92
Test Conductor Date

8.1.3.x76 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.x77 Remove the rod in Row 7 of the alignment gauge.

Rod Row 8 Alignment

8.1.3.x78 Position the Clamping Table at Row 8.

8.1.3.x79 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 9/29/92

8.1.3.x80 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 9/29/92

8.1.3.x81 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x82 Verify that the grippers were able to reach the rods in Row 8 without interference.

David M. Elmer 9/29/92
Test Conductor Date

8.1.3.x83 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.x84 Remove the rod in Row 8 of the alignment gauge.

Rod Row 9 Alignment

8.1.3.x85 Position the Clamping Table at Row 9.

8.1.3.x86 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 9/29/92

8.1.3.x87 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 9/29/92

8.1.3.x88 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x89 Verify that the grippers were able to reach the rods in Row 9 without interference.

David M. Elmer 9/29/92
Test Conductor Date

8.1.3.x90 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.x91 Remove the rod in Row 9 of the alignment gauge.

Rod Row 10 Alignment

8.1.3.x92 Position the Clamping Table at Row 10.

8.1.3.x93 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 9/29/92

8.1.3.x94 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 9/29/92

8.1.3.x95 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.x96 Verify that the grippers were able to reach the rods in Row 11 without interference.

David M. Elia 9/29/92
Test Conductor Date

8.1.3.x97 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.x98 Remove the rod in Row 10 of the alignment gauge.

Rod Row 11 Alignment

8.1.3.x99 Position the Clamping Table at Row 11.

8.1.3.y00 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 9/29/92

8.1.3.y01 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 9/29/92

8.1.3.y02 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.y03 Verify that the grippers were able to reach the rods in Row 11 without interference.

David M. Elia 9/29/92
Test Conductor Date

8.1.3.y04 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.y05 Remove the rod in Row 11 of the alignment gauge.

Rod Row 12 Alignment

8.1.3.y06 Position the Clamping Table at Row 12.

8.1.3.y07 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 9/29/92

8.1.3.y08 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 9/29/92

8.1.3.y09 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.y10 Verify that the grippers were able to reach the rods in Row 12 without interference.

David M. Chapman 9/29/92
Test Conductor Date

8.1.3.y11 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.y12 Remove the rod in Row 12 of the alignment gauge.

Rod Row 13 Alignment

8.1.3.y13 Position the Clamping Table at Row 13.

8.1.3.y14 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 9/29/92

8.1.3.y15 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 9/29/92

8.1.3.y16 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.y17 Verify that the grippers were able to reach the rods in Row 13 without interference.

David M. Chapman 9/29/92
Test Conductor Date

8.1.3.y18 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.y19 Remove the rod in Row 13 of the alignment gauge.

Rod Row 14 Alignment

- 8.1.3.y20 Position the Clamping Table at Row 14.
- 8.1.3.y21 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 9/29/92

- 8.1.3.y22 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 9/29/92

- 8.1.3.y23 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.
- 8.1.3.y24 Verify that the grippers were able to reach the rods in Row 14 without interference.

David M. Chan 9/29/92
Test Conductor Date

- 8.1.3.y25 Retract Pull Head Drive M-107B to a hold point position.
- 8.1.3.y26 Remove the rod in Row 14 of the alignment gauge.

Rod Row 15 Alignment

- 8.1.3.y27 Position the Clamping Table at Row 15.
- 8.1.3.y28 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 9/29/92

- 8.1.3.y29 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 9/29/92

- 8.1.3.y30 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.
- 8.1.3.y31 Verify that the grippers were able to reach the rods in Row 15 without interference.

David M. Chan 9/29/92
Test Conductor Date

- 8.1.3.y32 Retract Pull Head Drive M-107B to a hold point position.
- 8.1.3.y33 Remove the rod in Row 15 of the alignment gauge.

Rod Row 16 Alignment

8.1.3.y34 Position the Clamping Table at Row 16.

8.1.3.y35 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 9/24/92

8.1.3.y36 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 9/24/92

8.1.3.y37 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.y38 Verify that the grippers were able to reach the rods in Row 16 without interference.

David M. Chap 9/24/92
Test Conductor Date

8.1.3.y39 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.y40 Remove the rod in Row 16 of the alignment gauge.

Rod Row 17 Alignment

8.1.3.y41 Position the Clamping Table at Row 17.

8.1.3.y42 Record the PWR Clamping Table Control Screen Table Elevation M-106I's position indication.

Table Elevation M-106I: N/A 9/24/92

8.1.3.y43 Record the Clamping Table SW corner elevation.

SW Corner Table Elevation: N/A 9/24/92

8.1.3.y44 Extend Pull Head Drive M-107B forward to test rod alignment. It is not necessary to close the grippers.

8.1.3.y45 Verify that the grippers were able to reach the rods in Row 17 without interference.

David M. Chap 9/24/92
Test Conductor Date

8.1.3.y46 Retract Pull Head Drive M-107B to a hold point position.

8.1.3.y47 Remove the rod in Row 17 of the alignment gauge.

8.1.3.y48 IF warranted by test observations made above, THEN re-perform the rod-alignment retest and attach to this TPCN. Describe any variations made for the retest in the test log.

_____ Alignment test re-performed OR

not 9/29/92 Not applicable

8.1.3.y49 Acceptance Criteria

not 9/29/92 The pull heads and fuel rods are aligned in the same vertical plane adequately to access the rods for pulling.

David M. Chapman 9/29/92
Test Conductor Date

[Signature] 9/29/92
QA Date

Removal of W 17 X 17 Assemblies

8.1.3.y50 Raise the Clamping Table for removal of the fuel assemblies.

8.1.3.y51 Operating the RBT in the JOG Mode, remove the W 17 X 17 fuel assembly from the North Clamping Table position.

8.1.3.y52 Operating the RBT in the JOG Mode, remove the W 17 X 17 fuel assembly from the South Clamping Table position.

NOTE

The Accountability System is edited to update the system for transfer operations performed in the JOG mode.

8.1.3.y53 Acceptance Criteria

The control system indicates no load on the Clamping Table.

David M. Chapman 9/29/92
Test Conductor Date

[Signature] 9/29/92
QA Date

8.1.3.y54 Return the Clamping Table to the W 17 X 17 fuel configuration. Remove test equipment and fixtures.

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 02

TEMPORARY PROCEDURE CHANGE NOTICE

DATE 9/29/92

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE

PROCEDURE SECTION(S) TPCN 10 Step 8.1.3 267

PROCEDURE CHANGE: (Use reverse side if necessary.)

- ① 2.1.3.267 Delete requirement to obtain setpoint printout for Downcorder and RBT.
- ② 2.1.3.14.7.15 Delete "Close" indication recording requirement.

REASON FOR CHANGE:

- ① TPCN 23 deleted HAND Made testing.
- ② Close position indication would be accurate only if fuel was clamped. This testing is deleted as per TPCN 23.

CLASSIFICATION OF CHANGE

MINOR ☒ YES ☐ NO

MAJOR ☐ YES ☐ NO

REVISION TO ORIGINAL PROCEDURE REQUIRED ☐ YES ☐ NO

APPROVALS

Daniel M. Chan 9/27/92 (1)(2)
TEST ENGINEER DATE

QUALITY ASSURANCE DATE (2)

PROJECT ENGINEER DATE (2)

TEST DIRECTOR DATE (2)

- Notes: (1) Required for minor changes
(2) Required for major changes

HALLIBURTON NUS
Environmental Corporation

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 03

EXCEPTION/REPAIR LOG

DATE 5/21/52

LOG RL #1

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CAMPING TABLE

PROCEDURE SECTION(S) 2.16 & 8.3.6.4

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Camera 7 not installed

TEST CONDUCTOR Eng Gungst 5/21/92

SOLUTION/CORRECTIVE ACTION:

ION/CORRECTIVE ACTION:
Camera 7 will be checked out independent of
the SOT when installed.

245 Koverst 5/21/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE _____ DATE _____ (1)

PROJECT ENGINEER _____ DATE _____ (1)

TEST DIRECTOR _____ DATE _____ (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE Camera is installed and testing is completed as per TPCNIO.

Michael Cha 9/20/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 03

EXCEPTION/REPAIR LOG

DATE 5/21/92

LOG RL #2

PROCEDURE NO. _____ REV. _____ TITLE _____

PROCEDURE SECTION(S) 3.4

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE: 2ND BTW assembly is in
Rack but will be placed on storage rack before
it is needed. 1ST BTW assembly is on shelf /
shelf is not important

TEST CONDUCTOR 2/3 Forest

SOLUTION/CORRECTIVE ACTION: accept as is

See TPCN 11, Item 3 ^{unc} 7/23/92

2/3 Forest 5/21/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Frank M. Hall 6/8/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 03

EXCEPTION/REPAIR LOG

DATE 5/21/92

LOG RL # 3

PROCEDURE NO. 9315-TP-202

REV. 1

TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.3.1.1

CLASSIFICATION OF CHANGE: REPAIR

REDESIGN /

TPCN#

PROBLEM AND CAUSE:

DIFFICULTY GETTING ACCURATE MEASUREMENTS FROM
REFERENCE PLANE WAS ENCOUNTERED USING TAPE
MEASURE. CRITERIA FOR DIFFERENCE IN TABLE
HEIGHT FOR SUCCESSIVE STEPS NOT MET. DUE
TO MEASURING DISCREPANCIES

TEST CONDUCTOR EAS Farnest

SOLUTION/CORRECTIVE ACTION:

NEW REFERENCE PLANE ESTABLISHED AT HIGHER
LEVEL AND SET UP FOR MICROMETER READINGS
TO IMPROVE ACCURACY

RETEST SECTION 5

USING NEW REFERENCE
PLANE.

EAS Farnest 5/21/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Frank H. Nullo 7/27/92
TEST CONDUCTOR DATE

Retest

RL # 3

*RL #3
Page 2 of 4
5/28/92*

*TCN 10 rep-forms
existing for this
Section for
all criteria
except time.
vme 7/31/92*

8.3 System Verification for the W 17x17 fuel type

8.3.1 Drive System Operation Verification Test

WARNING

Keep clear of system during operation

8.3.1.1 Verify the elevation drive (M-106I) as follows:

1. Switch the control system to the ~~OK~~ ^{HAND} mode and drive the elevation drive down until it automatically shuts off.

7/28/92

*RL #9, 7/92
TPCN #2 4/24/92
7/28 5/26/92*

- ~~2. Connect instrument leads to the drive motor (M-106I) for measuring torque.~~

*** TAKE PHOTOGRAPHS AND RECORD INFORMATION IN LOG ***

3. Measure and record the distance from the top of the table (DWG 9315-S-2109, item 14) to the reference ~~surface~~ ^{POINT} at each corner.

7/28 5/26/92

*TPCN #5
7/28
5/26/92*

Type of Measuring Device	Range
Identification No.	Calibration Due Date

Position	Distance
Northeast Corner	42 5/16"
Northwest Corner	42 3/8"
Southwest Corner	42 3/8"
Southeast Corner	42 3/8"

*42.3125
42.375
42.375
42.375
} vme 7/28/92*

Acceptance Criteria

- All measurements are within $\pm .09$ inches.

Test Conductor

Fred D. Coleman

Date

5/28/92

QA

C.R. Claggett

Date

5/28/92

Re test

RL # 3

RL # 3
Page 3 of 4
7/13/92

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 77 of 161

TPCW # 2, ^{vrc} 7/23/92
RL 9

4. Drive the table top up until it automatically shuts off. ~~Record motor torque and~~ Measure and record the distance from the top of the table to the reference surface at the same points measured in Step 3 above. ~~Record 7/26/92~~

Type of Measuring Device	Caliper	Range	0-11.3"
Identification No.	NUS-001	Calibration Due Date	11/26/92

TPCW # 2, ^{vrc} 7/23/92
RL 9

TORQUE

|||||

Distance

- Northeast Corner 3.348
- Northwest Corner 3.371
- Southwest Corner 3.341
- Southeast Corner 3.342

Second reading

3.419
~~3.365~~
3.380
3.421

Uche: checked over
pencil
Use 9/26/92

Acceptance Criteria

- ~~• Torque 5 to 5.4 lb ft.~~
- All measurements above are within ± 0.09 in.

TPCW # 2, ^{vrc} 7/23/92
RL 9

Test Conductor

J. H. Edman

Date 5/29/92

QA

C. R. Claggett

Date 5/29/92

5. Press "CONTINUE" on the control console to drive the table top up. When motor automatically shuts off, record the distance from the top of the table to the reference surface at the same points measured in Step 3 above.

Type of Measuring Device	Caliper	Range	0-11.3"
Identification No.	NUS-001	Calibration Due Date	11/26/92

TPCN #2, ^{unc} 7/23/92
RL 9

~~TORQUE~~

~~+++++~~

Distance

- Northeast Corner 3.853
- Northwest Corner 3.881
- Southwest Corner 3.840
- Southeast Corner 3.848

RL #4

Acceptance Criteria

TPCN #2, ^{unc} 7/23/92
RL 9

- ~~Torque is to 5.4 lb-ft.~~
- All measurements above are within ± 0.09 in.
- The difference between respective measurements between the respective measurements from this step 4 and the previous step above is 0.496 ± 0.01 in.

Test Conductor

Fred S. Coleman
C.R. Claggett

Date 5/29/92

RL #4

QA

Date 5/29/92

6. Repeat Step 5 above 15 additional times until the table is in the full-up position.

Type of Measuring Device	<u>Caliper</u>	Range	<u>0-113 in.</u>
Identification No.	<u>NUS-001</u>	Calibration Due Date	<u>11/24/92</u>

TEST PROCEDURE 9315-TP-202

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EXCEPTION/REPAIR LOG

DATE 5/29/92

LOG R.L. #4

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.3.1.1.5, 8.3.1.1.6

CLASSIFICATION OF CHANGE: REPAIR N/A REDESIGN N/A TPCN# N/A

PROBLEM AND CAUSE:

9 of the 60 incremental measurements did not fall within the acceptance criteria range of $0.496 \pm .01$ in. or $0.486" - 0.506"$ (range from full down to 15th row.)

TEST CONDUCTOR Fred G. Coleman

SOLUTION/CORRECTIVE ACTION: The greatest out-of-tolerance was $0.004"$ which is not critical and due to measurement error. Suggest accept as is, and write up TCN.

Fred G. Coleman 5/29/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

NOTE: TCN not required

Test section 8.3.3 (TPCN #8) verify proper set up (interface)
Frank M. Hall 7/22/92
TEST CONDUCTOR DATE

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PAGE 03

~~EXCEPTION/REPAIR LOG~~

LOG ERL #6

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.3.1.3.2, 8.3.1.3.4, 8.3.1.3.9

CLASSIFICATION OF CHANGE: REPAIR N/A REDESIGN N/A TPCN# _____

PROBLEM AND CAUSE:

DISTANCE BETWEEN CLAMP JAWS IN OPEN POSITION
(MID6C - POSITION #1) DID NOT MEET ACCEPTANCE CRITERIA
OF 10.42 ± 0.03 in. ~~MEASURED AT 10.093" - 10.~~
792 6/2/92

TEST CONDUCTOR Fred B. Coleman

SOLUTION/CORRECTIVE ACTION:

SUGGEST ACCEPT AS IS. CLAMP JAWS ARE OPEN WIDE ENOUGH TO
ACCEPT LARGEST FUEL ASSEMBLY. WRITE UP TCN
J. G. R. 6/1/92

Fred G. Coleman 6/1/92

TEST CONDUCTOR DATE

QUALITY ASSURANCE _____ DATE _____ (1)

PROJECT ENGINEER _____ DATE _____ (1)

TEST DIRECTOR _____ DATE _____ (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

THE CNOOT revises criteria to 710 265 inches for bowed rods.
Acceptance criteria is signed off based on lesser dimensions for
phase III

TEST CONDUCTOR _____ DATE _____

Item transferred to open items tracking list for
Phase IV resolution. OITL # 166wink/q2
241 v 10/1/92

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LOG RL #7

DATE _____
PROCEDURE NO. ⁷⁸¹ 83 9315-TP-202

REV. 1

TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.3.1.3.3

CLASSIFICATION OF CHANGE: REPAIR N/A REDESIGN N/A TPCN# _____

PROBLEM AND CAUSE:

DISTANCE between clamp jaws in closed position (M106C - position #1) did not meet acceptance criteria of 8.22 ± 0.03 in. Measured at 8.003"

TEST CONDUCTOR Fred G. Coleman

SOLUTION/CORRECTIVE ACTION:

Suggest accept as is. Clamp jaws closing lower than tolerance limit
 is acceptable. Write up TCN

Fred G. Coleman 6/1/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE _____ DATE _____ (1)

PROJECT ENGINEER _____ DATE _____ (1)

TEST DIRECTOR _____ DATE _____ (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

TAC (2007) revises criteria to ≤ 8.15 inches

David M. Chapin 7/21/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE D3

EXCEPTION/REPAIR LOG

DATE 6/1/92 LOG RL #8
 PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE
 PROCEDURE SECTION(S) 8.3.1.3.7 8.3.1.3.8
 CLASSIFICATION OF CHANGE: REPAIR N/A REDESIGN N/A TPCN#

PROBLEM AND CAUSE:

The force exerted by the lower clamps (Position #1) did not meet the acceptance criteria of between 1000 - 1100 #. There is no test data to support the 1000 # lower limit, which could lower acceptance to < 1000 #.

TEST CONDUCTOR Frank Coleman

SOLUTION/CORRECTIVE ACTION: Perform Test Sections 8.1.3 and 8.1.4 (Clamp Table loading) to determine possible acceptability, off < 1000 # clamp force, OR replace gear head, OR increase power supply.

Retest 8.3.1.3.7 if
 < 1000 # not acceptable.

Frank Coleman 6/1/92
 TEST CONDUCTOR DATE

 QUALITY ASSURANCE DATE (1)

 PROJECT ENGINEER DATE (1)

 TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

TPCN 9 verify proper operation of Clamps
Frank H. Nullo 7/27/92
 TEST CONDUCTOR DATE

TPCNOCT revises criteria to 700 to 1200 lbs.
 Use 7/21/92
 This item in the TCM is voided. This remains
 an open item. QTC # 160
David McEwen 10/5/92

TEST PROCEDURE

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EXCEPTION/REPAIR LOG

DATE 6/2/92

LOG RL #9

PROCEDURE NO. 9315-TP-202

REV. 1

TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.1.4, 8.3.1

CLASSIFICATION OF CHANGE: REPAIR N/A REDESIGN N/A TPCN# 2

PROBLEM AND CAUSE:

Delete all references to torque measurement, and
~~associated sign. EFS~~ JPK 6/1/92

TEST CONDUCTOR Fred G. Coleman

SOLUTION/CORRECTIVE ACTION:

Refer to TCN 004.

Fred G. Coleman 6/2/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Frank D. Bullo 7/2/92
TEST CONDUCTOR DATE

HALLIBURTON NUS
Environmental Corporation

TEST PROCEDURE 9315-TP-202

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EXCEPTION/REPAIR LOG

DATE 6/2/92 LOG RL # 10

DATE _____
PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.3.12.3, 8.3.12.4, 8.3.12.5

CLASSIFICATION OF CHANGE: REPAIR N/A REDESIGN N/A TPCN# N/A

PROBLEM AND CAUSE:

M AND CAUSE:
Revise acceptance criteria for upper clamp slide (M106A) drive by:

- 1) deleting distance to end of rails requirement.
- 2) changing slide travel from 16.00 ± 0.03 in. to 4.75 ± 0.25 in.

TEST CONDUCTOR Fred Coleman

SOLUTION/CORRECTIVE ACTION:

Refer to TCN #002 for justification. TCN 002 written up.

TEST CONDUCTOR Paul G. Whelan DATE 6/2/92

QUALITY ASSURANCE _____ DATE _____ (1)

PROJECT ENGINEER _____ DATE _____ (1)

TEST DIRECTOR _____ DATE _____ (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Frank H. Halls 7/22/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

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EXCEPTION/REPAIR LOG

DATE 6/2/92 LOG RL # 11

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.3.4.3.3, 8.3.4.4.3, 8.3.4.5.3, 8.3.4.6.3

CLASSIFICATION OF CHANGE: REPAIR N/A REDESIGN N/A TPCN# 3

PROBLEM AND CAUSE:

Expected results for Tests ii and iii for Clamp Drive Motors 106C, 106D, 106E2 and 106G2 are incorrectly stated as "NO" and "NO". They should be "yes", i.e. the motors operate under the conditions applied.

TEST CONDUCTOR Fred Coleman

SOLUTION/CORRECTIVE ACTION:

Write up TCN 003

Fred G. Coleman 6/2/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Frank G. Hall
TEST CONDUCTOR

7/2/92
DATE

HALLIBURTON NUS
Environmental Corporation

TEST PROCEDURE 9315-TP-202

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EXCEPTION/REPAIR LOG

DATE 6/2/92

LOG RL # 12

PROCEDURE NO. 9315-TP-202

REV. 1

TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.3.1.5.2, 8.3.1.5.4, 8.3.1.5.9

CLASSIFICATION OF CHANGE: REPAIR N/A

REDESIGN 2/A

TPCN# N/A

PROBLEM AND CAUSE:

Distance between bar and cable in closed position (upper end clamp slide, positions "1," "2" ^{M10662} M10662) did not meet acceptance criteria of $7.22 \pm .03 - .06$ in.

TEST CONDUCTOR Fred G. Coleman

SOLUTION/CORRECTIVE ACTION:

6/3/92
Fred G. Coleman
6/2/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE _____ DATE _____ (1)

PROJECT ENGINEER _____ DATE _____ (1)

TEST DIRECTOR _____ DATE _____ (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE TENOQ7 revises criteria to 48.15 inches

W. M. Chap 7/31/92
TEST CONDUCTOR DATE

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MUS 340 REVISED 12/00

TEST PROCEDURE 9315-TP-202

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EXCEPTION/REPAIR LOG

DATE 6/4/92 LOG RL #14

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE

PROCEDURE SECTION(S) 8.1.6.9 - 8.1.6.14

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Ad not meet acceptance criteria of $1300 \pm 100 \#$ for lower lamp pull test.

TEST CONDUCTOR Fred Coleman

SOLUTION/CORRECTIVE ACTION:

Assembly Devise new pull test rig and retest
72 Sections 8.1.6.9 thru 8.1.6.14

TEST CONDUCTOR Fred Coleman DATE 6/4/92

QUALITY ASSURANCE _____ DATE _____ (1)

PROJECT ENGINEER _____ DATE _____ (1)

TEST DIRECTOR _____ DATE _____ (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

TEST 9 verifies proper operation of clamps
 Frank M. Muller 7/22/92
 TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

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EXCEPTION/REPAIR LOG

DATE 6/5/92 LOG RL #15
 PROCEDURE NO. 9315-TP-202 REV. 1 TITLE CLAMPING TABLE
 PROCEDURE SECTION(S) 8.1.3.1, 8.1.3.7
 CLASSIFICATION OF CHANGE: REPAIR ☒ REDESIGN ☐ TPCN#

PROBLEM AND CAUSE:

No load indication present at control station for
 position 1 and 2. Load cell surface not touching bottom of fuel
 assembly.

 TEST CONDUCTOR Fred S. Coleman

SOLUTION/CORRECTIVE ACTION:

Investigate set points and/or mechanical action to determine
 cause of no load indication.

Transfer re-test to
 SOT - RBT
 Re-test to be performed by TPCN14
 vnc 713192

Fred S. Coleman 6/5/92
 TEST CONDUCTOR DATE
 _____ (1)
 QUALITY ASSURANCE DATE
 _____ (1)
 PROJECT ENGINEER DATE
 _____ (1)
 TEST DIRECTOR DATE

Notes: (1) Required for redesign
 Reference 9315-TP-201 RL#6. DCN038 revised setpoint
 to 125. See also RL#18 this procedure.

 CORRECTIVE ACTION: COMPLETE see RL#41 this test procedure

Wendy McLean 9/30/92
 TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

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EXCEPTION/REPAIR LOG

DATE 6/23/92 LOG RLH 16PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____PROCEDURE SECTION(S) 8.1.6.7CLASSIFICATION OF CHANGE: REPAIR ☒ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Step 8.1.6.7 and TPCN 9 require the application of 2600 ± 50 lbs. The actual test force was (68 mv $\Rightarrow$) 2900 lbs as documented in the test log entry at 1815 on 6/9/92. The cause is attributed to an excessively tight tolerance of about 2% for field conditions.

TEST CONDUCTOR Daniel M. Chapman

SOLUTION/CORRECTIVE ACTION:

Acceptance is 2900 lbs, as measured, is an acceptable test force.
Prepare TPCN and TAC Change Notice to increase the tolerance to $\pm 250/-50$.
TPCN #12; TAC CNO07, Item 4

Daniel M. Chapman 7/23/92
TEST CONDUCTOR DATE_____
QUALITY ASSURANCE DATE (1)_____
PROJECT ENGINEER DATE (1)_____
TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

TPCN approved by NUS

Daniel M. Chapman 7/31/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

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EXCEPTION/REPAIR LOG

DATE 7/23/92

LOG RL #17

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) 8.1.6, Page 32 and 33

CLASSIFICATION OF CHANGE: REPAIR ☒ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

The calibration data is recorded for the 12" calipers used in Steps 8.1.6.6 and 8.1.6.7. This recorded data indicates the calibration due date is 5/26/92 for testing performed on 6/4/92.

TEST CONDUCTOR Wesley M. Chapman

SOLUTION/CORRECTIVE ACTION:

The caliper actually shows a calibration date of 5/26/92. This is when it was calibrated, not ~~when~~ ^{when} calibration is due. Annotate RL # at the data and accept as is. Calibration would be due on 5/26/93.

Wesley M. Chapman 7/23/92
TEST CONDUCTOR DATE

R. M. [Signature] 7/23/92 (1)
QUALITY ASSURANCE DATE

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Wesley M. Chapman 7/23/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

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EXCEPTION/REPAIR LOG

DATE 8/6/92 LOG RL#18

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) _____

CLASSIFICATION OF CHANGE: REPAIR ☒ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Testing as per TP-201 for the Red Extraction System observed that a clamping table load cell was not functioning. Reference TP-201 RL#6 setpoint was changed to 125 lbf. OCU was to be written to document revised setpoint.

TEST CONDUCTOR David McChapman 8/6/92

SOLUTION/CORRECTIVE ACTION:

Re-testing as per TPCN10 will demonstrate function.

David McChapman 8/6/92
TEST CONDUCTOR _____ DATE _____

QUALITY ASSURANCE _____ DATE _____ (1)

PROJECT ENGINEER _____ DATE _____ (1)

TEST DIRECTOR _____ DATE _____ (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE See Exception/Repair Log RL# 41.

David McChapman 9/30/92
TEST CONDUCTOR _____ DATE _____

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 03

EXCEPTION/REPAIR LOG

DATE 8/11/92 LOG 19

PROCEDURE NO. TPCN 10 REV. 0 TITLE _____

PROCEDURE SECTION(S) 0.1.3.6

CLASSIFICATION OF CHANGE: REPAIR ☒ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Downender faulted on homing - Bottom support homed correctly, carriage drive faulted on torque. To be transferred to Open Items Tracking List. This problem will impact testing for W17x17 assemblies but not for initial testing with the BOWISx15 assemblies.

TEST CONDUCTOR Vincent M. Chapman 8/11/92

SOLUTION/CORRECTIVE ACTION: Open Items Tracking List # 245.

Carriage was subsequently homed. Problem may stem from lack of frequent use.

Vincent M. Chapman 8/11/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE Problem with carriage is resolved.

Vincent M. Chapman 8/11/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

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PAGE 03

EXCEPTION/REPAIR LOG

DATE 8/11/92 LOG 20

PROCEDURE NO. TPCN 10 REV. 0 TITLE _____

PROCEDURE SECTION(S) 8.1.3.16

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

^{upper motor}
Clamping Table elevation hand stop is inside and is not accessible for measurement. Verification that motor did not contact hand stop can be made by observing that no torque fault occurs at up end of travel.

TEST CONDUCTOR Daniel M. Chapman 8/11/92

SOLUTION/CORRECTIVE ACTION:

no torque fault was observed at upper end of travel with JAG made. Thus, we did not actuate the upper end of travel.

Daniel M. Chapman 8/11/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE criteria is unified.

Daniel M. Chapman 8/11/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

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EXCEPTION/REPAIR LOG

DATE 8/11/92

LOG 21

PROCEDURE NO. TPCN 14 REV. 0 TITLE _____

PROCEDURE SECTION(S) 2.1.3.8, 9, 10 & 11

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Neither upper or lower clamp slide is provided with internal cam switch or proximity sensor to prevent contact with hard stop.

TEST CONDUCTOR _____

SOLUTION/CORRECTIVE ACTION:

Design for these type of motors does not require cam switches or proximity sensors to prevent jog mode mechanical end of travel. Motor stop, as per design, on over-torque. It is acceptable that contact is made with hard stop or at end of screw threads. TAC CW 002 applies to both slides in the direction of the "end of slide detection".

David M. Chapman 8/11/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE No further action is required. Procedure was incorrectly prepared.

David M. Chapman 8/11/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 03

EXCEPTION/REPAIR LOG

DATE 2/11/92 LOG _____

PROCEDURE NO. TPCN-16 REV. 0 TITLE _____

PROCEDURE SECTION(S) 8.1.3.8

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Lower clamp slide overtime fault East to West when operating in the Jig mode, the slide overtime fault occurred.

TEST CONDUCTOR Virgil M. Chapman

SOLUTION/CORRECTIVE ACTION: The range of travel is significantly greater ($15\frac{5}{8}$ ") than the range required in programmed operations (3.022 "). The overtime fault is appropriately set for programmed operations.

Virgil M. Chapman 2/11/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE No action required.

Virgil M. Chapman 2/19/92
TEST CONDUCTOR DATE

TEST PROCEDURE

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EXCEPTION/REPAIR LOG

DATE 8/11/92

LOG _____

PROCEDURE NO. TPCN 10

REV. 0

TITLE _____

PROCEDURE SECTION(S) 8.1.3.8

CLASSIFICATION OF CHANGE: REPAIR _____

REDESIGN _____

TPCN# _____

PROBLEM AND CAUSE:

Lower Clamp slide travel West in Jcy made ended in torque fault.

TEST CONDUCTOR

David M. Chapman

SOLUTION/CORRECTIVE ACTION: See RL#21

David M. Chapman
TEST CONDUCTOR

8/11/92
DATE

QUALITY ASSURANCE

DATE

(1)

PROJECT ENGINEER

DATE

(1)

TEST DIRECTOR

DATE

(1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

See RL#21

David M. Chapman
TEST CONDUCTOR

8/11/92
DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 03

EXCEPTION/REPAIR LOG

DATE 8/11/92 LOG _____

PROCEDURE NO. TPCNIU REV. 0 TITLE _____

PROCEDURE SECTION(S) B.1.3.10

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Upper clamp slide travels $19\frac{9}{32}$ rather than upper limit of 18.5 inches.

TEST CONDUCTOR David M. Chapin 8/11/92

SOLUTION/CORRECTIVE ACTION: The test procedure's range of travel was based on the FAT test result which indicated 18.5 inches but with an intended distance of 1 ± 0.03 " from end of slide. The correct entry would have been 19.5 inches ± 0.03 " from hard stop. However, $19\frac{9}{32}$ " is an adequate range of travel with the design range of 16" covered. Accept as is.

David M. Chapin 8/11/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Accept as is.

David M. Chapin 8/11/92
TEST CONDUCTOR DATE

EST PROCEDURE 9315-TP-202 REVISION 1 PAGE D3

EXCEPTION/REPAIR LOG

DATE 8/11/92 LOG 25

PROCEDURE NO. TPCN 14 REV. 0 TITLE _____

PROCEDURE SECTION(S) 8.1.3.14

CLASSIFICATION OF CHANGE: REPAIR ☒ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Upper Clamp M106G2 was observed to stop raising at a high point even though the motor continued running. Attempting to lower it, the clamp did not lower.

TEST CONDUCTOR W. J. Chapman 8/11/92

SOLUTION/CORRECTIVE ACTION:

1. Repair
2. Re-Set-up - Completed w/c 8/11/92. Reset resolver & checked setpoints.
2. Re-test - Completed w/c 8/12/92 - Setpoints, Indication, clamp force.

1. The unit is checked out mechanically. No problem is identified which will impact further testing. Operations in programmed modes will not repeat the range of over travel. WJC 8/11/92

W. J. Chapman 8/12/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Setpoints and operations for both upper clamps were checked, set-up, and tested. See OCN 40 for documentation WJC 8/14/92

W. J. Chapman 8/12/92
TEST CONDUCTOR DATE

Upper Clamp Jog Mode Testing**NOTE**

Use the Emergency Stop feature or other methods as required to obtain the upper clamp swing point dimension. The upper clamp opens by raising the clamp bar clear of the fuel assembly and then swinging the clamp bar away from the fuel assembly. The swing point dimension is expected to be greater than 8.536 inches which is the height of a B&W 15 X 15 fuel assembly. Repeated testing may be performed to obtain a reliable dimension.

Upper Clamp 1 M-106E2 Jog Mode Operations

- 8.1.3.14 Operate Upper Clamp 1 M-106E2 open and closed recording clamp closed indication and dimension, clamp swing point dimension, and clamp open position indication. Observe that the clamp bar opens (E/W) to contact the open stop to clear the space allocated for assembly removal and loading. Observe that the clamp bar rotates to a N/S orientation in closure.

Swing Point Dimension:	<u>N/A vlc 8/12/92</u>
* OPEN Dimension:	<u>10.415"</u>
OPEN Indication:	<u>10.452" ①</u>
CLOSE Dimension:	<u>8.137"</u>
*CLOSE Indication:	<u>8.171"</u>

* Type of Measuring Device: Caliper Range: 12"
 Identification No: 52-008-013 ^{Fowler} Calibration Date: 5/26/92

Load test: 175 lbs ^{**} with 8.171" close indication

** Dillon X 92274 Compression Force Gauge 0-2000 # Cal Due 10/8/92

- ① Discrepancy between measured dimension and indicated position are significantly impacted by Process Control System sampling periods.
 ✓ 8/12/92

Upper Clamp 2 M-106G2 Jog Mode Operations

- 8.1.3.15 Operate Upper Clamp 2 M-106G2 open and closed recording clamp closed indication and dimension, clamp swing point dimension, and clamp open position indication. Observe that the clamp bar opens (E/W) to contact the open stop to clear the space allocated for assembly removal and loading. Observe that the clamp bar rotates to a N/S orientation in closure.

Swing Point Dimension:	<u>N/A UNC 8/12/92</u>
*OPEN Dimension:	<u>10.379"</u>
OPEN Indication:	<u>10.444"</u>
*CLOSE Dimension:	<u>8.101"</u>
CLOSE Indication:	<u>8.151"</u>

*

Type of Measuring Device: Caliper	Range: <u>12"</u>
Fowler	
Identification No: <u>52008-017</u>	Calibration Date: <u>5/26/92</u>

Load test: 120 lbs ** with 8.28" close indication

** Dillon X 92374 Compression Force Gauge 0-2000 lb Cal Due 10/8/92

Acceptance Criteria

- Gap between clamp bar and fuel assembly cradle is ^{max} 4.15 inches.
- Clamp hold down force is 160 to 200 lbs.

<u>David M. Elmer</u>	<u>8/12/92</u>
Test Conductor	Date
<u>LT M. J. [Signature]</u>	<u>8/12/92</u>
QA	Date

TEST PROCEDURE

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PAGE 03

EXCEPTION/REPAIR LOG

DATE 8/11/92

LOG _____

PROCEDURE NO. TPCN 14

REV. 0

TITLE _____

PROCEDURE SECTION(S) 8.1.3.120

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Bottom support setpoints must be re-programmed for the change in the location of the lower proximity sensor. α

TEST CONDUCTOR

Virgil M. Chapman 8/11/92

SOLUTION/CORRECTIVE ACTION: ~~Demander bottom support setpoint for W17X17 must be established and verified before performing bottom clamp alignment checks.~~ Revised testing of TPCN 10 as per TPCN 22 does not require that the Demander setpoints be accurate. This exception is no longer valid. 9/22/92

Virgil M. Chapman
TEST CONDUCTOR

9/22/92
DATE

QUALITY ASSURANCE

DATE (1)

PROJECT ENGINEER

DATE (1)

TEST DIRECTOR

DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Virgil M. Chapman
TEST CONDUCTOR

9/22/92
DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 03

EXCEPTION/REPAIR LOG

DATE 8/11/92 LOG 27

PROCEDURE NO. TPCN 16 REV. 0 TITLE _____

PROCEDURE SECTION(S) 8.1.3.17

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Total travel distance measured in the JOC mode was 11.95 inches. The criteria requires 11.62 ± 0.15 or 11.77 max. The original TAC item stated "covers a range of 11.62 inches". TAC C001 revised it to 11.62 ± 0.15 inches. The criteria, as originally worded, was met. The tolerance added by TAC C001 was not met.

TEST CONDUCTOR _____

SOLUTION/CORRECTIVE ACTION:

The range of travel is acceptable.

<u>David McChapman</u>	<u>8/11/92</u>
TEST CONDUCTOR	DATE
_____	DATE (1)
QUALITY ASSURANCE	DATE
_____	DATE (1)
PROJECT ENGINEER	DATE
_____	DATE (1)
TEST DIRECTOR	DATE

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

<u>David McChapman</u>	<u>8/11/92</u>
TEST CONDUCTOR	DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE D3

EXCEPTION/REPAIR LOG

DATE 8/11/92 LOG 28

PROCEDURE NO. TPCN 16 REV. 0 TITLE _____

PROCEDURE SECTION(S) E.1.3.16

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

The clamping table distance from the hand stop could not be measured by calipers.
The measurement was made with a tape measure.

TEST CONDUCTOR Wesley M. Chapman

SOLUTION/CORRECTIVE ACTION:

The criteria is that the hand stop not be contacted. This is verified by visual clearance in the shaft and the fact that motor torque fell. It did not occur. The fact that a calibrated measure was not made does not impact the validity of the testing. Accept as is.

Wesley M. Chapman 8/11/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Wesley M. Chapman 8/12/92
TEST CONDUCTOR DATE

TEST PROCEDURE

9315-TP-202

REVISION 1

PAGE D3

EXCEPTION/REPAIR LOG

DATE 8/12/92

LOG 29

PROCEDURE NO. TPCN 14

REV. 0

TITLE _____

PROCEDURE SECTION(S) 2.1.3.5 (Repeat)

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Software configuration control question on NUS BDU File (Ladder Logic Binary File)
The data changes each time the program is downloaded.

TEST CONDUCTOR Virgil M. Chapman

SOLUTION/CORRECTIVE ACTION:

Configuration control is maintained procedurally by logging revisions in a special File. There was no revision log entry. There was no configuration change. Accept as is.

Virgil M. Chapman
TEST CONDUCTOR

8/12/92
DATE

QUALITY ASSURANCE

DATE

(1)

PROJECT ENGINEER

DATE

(1)

TEST DIRECTOR

DATE

(1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE resolved by Ted Zygmunt.

Virgil M. Chapman
TEST CONDUCTOR

8/19/92
DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 03

EXCEPTION/REPAIR LOG

DATE 8/11/92 LOG 22

PROCEDURE NO. TPCN 10 REV. 0 TITLE _____

PROCEDURE SECTION(S) 8.1.3.253

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# 19

PROBLEM AND CAUSE:

Step 8.1.3.253 specifies Single Mode operations. The requirement should be "programmed" mode since, for this function, the specific programmed mode is not relevant. Operations in the Single mode places undue requirements for simulation of fuel and sequencing.

TEST CONDUCTOR Daniel McChapman

SOLUTION/CORRECTIVE ACTION:

Perform operation in HAND mode. See TPCN 19 to TPCN 10.

Daniel McChapman 8/13/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE TPCN 19 implemented

Daniel McChapman 8/19/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 03

EXCEPTION/REPAIR LOG

DATE 8/14/92

LOG 31

PROCEDURE NO. TPCN 14

REV. 4

TITLE _____

PROCEDURE SECTION(S) 8.1.3.20

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Rod extraction system restores Clamping Table as required but sequence does not proceed to completion. This is apparently because the side Transfer (and NFBC) are off line which is not "busy".

TEST CONDUCTOR Daniel M. Pham

SOLUTION/CORRECTIVE ACTION:

DCN to be implemented to correct bug in Clamping Table initialization sequence.
DCN #41. Fix is programmed and tested. Works fine.

Daniel M. Pham 8/14/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

Daniel M. Pham 9/22/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE D3

EXCEPTION/REPAIR LOG

DATE 8/14/92 LOG _____

PROCEDURE NO. 9315-TP-202 ^{TPCN 10} REV. 0 TITLE _____

PROCEDURE SECTION(S) 2.1.3.28

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:
critical clearance from hard stop is 15/16" - Checked twice

TEST CONDUCTOR W. M. Chapman 8/14/92

SOLUTION/CORRECTIVE ACTION: *Correct setpoint to 21.00".
Corrected resolver count by 1 to get required 1" clearance. Draw out to document.*

W. M. Chapman 8/14/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

W. M. Chapman 8/14/92
TEST CONDUCTOR DATE

EST PROCEDURE 9315-TP-202 REVISION 1 PAGE D3

EXCEPTION/REPAIR LOG

DATE 8/14/92 LOG _____

PROCEDURE NO. TPCN 10 REV. 0 TITLE _____

PROCEDURE SECTION(S) 2.13.23, 25, 28

CLASSIFICATION OF CHANGE: REPAIR N/A REDESIGN N/A TPCN# N/A

PROBLEM AND CAUSE:
Could not position calipers to obtain required measurements for distance from hand steps for upper/lower clamp slides. Used a tape measure instead.

TEST CONDUCTOR Vincent M. Chapman

SOLUTION/CORRECTIVE ACTION:
None. A tape measure provides sufficient accuracy for these measurements. Appropriate measuring instruments were not available for the difficult measurement.

<u>Vincent M. Chapman</u>	<u>8/18/92</u>
TEST CONDUCTOR	DATE
_____	DATE (1)
QUALITY ASSURANCE	
_____	DATE (1)
PROJECT ENGINEER	
_____	DATE (1)
TEST DIRECTOR	

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

<u>Vincent M. Chapman</u>	<u>8/19/92</u>
TEST CONDUCTOR	DATE

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 03

EXCEPTION/REPAIR LOG

DATE 8/17/92

LOG 34

PROCEDURE NO. 9315-TP-202 ^{TPCN 10}

REV. 01

TITLE

PROCEDURE SECTION(S)

CLASSIFICATION OF CHANGE: REPAIR ☒

REDESIGN ☐

TPCN#

PROBLEM AND CAUSE:

Torque fault on lower clamp slide during pre-require the restore process.
Bad motor.

TEST CONDUCTOR

Nigel M Chapman

SOLUTION/CORRECTIVE ACTION:

Investigate and repair. Retest if required.

Motor was defective and was ^{repaired and} replaced. Functional check was performed. No retest is required.

TEST CONDUCTOR

Nigel M Chapman

8/19/92

DATE

QUALITY ASSURANCE

DATE

(1)

PROJECT ENGINEER

DATE

(1)

TEST DIRECTOR

DATE

(1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

TEST CONDUCTOR

Nigel M Chapman

8/19/92

DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 03

EXCEPTION/REPAIR LOG

DATE 8/17/92 LOG 35

PROCEDURE NO. TPCN 14 REV. 0 TITLE _____

PROCEDURE SECTION(S) 8.1.3.41 (Relax), 8.1.3.54 (Relax), 8.1.3.65, 8.1.3.79, 8.1.3.96, 8.1.3.111

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Hand mode operations do not reach the auto mode's UP setpoint. This provided skewed data in initial testing.

TEST CONDUCTOR David M. Chapman

SOLUTION/CORRECTIVE ACTION:

Return to the UP position by using the restore or other auto mode process. Re-calculate data based on auto mode setpoint via this method. Revise procedure as per TPCN 20. Input discrepancy to open items tracking list (att. 1)

David M. Chapman 8/17/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE OITL # 247

David M. Chapman 8/19/92
TEST CONDUCTOR DATE

RL #35
attachment 1

ADDITIONS TO PUNCH LIST

ITEM NO. 247 WBS NO. 1321 DATE 8/19/92 SOURCE VN Chapman
SYSTEM Clamping Table RESPONSIBLE ENGINEER KG
CATEGORY I-P I-S I-W I-O I-M (II)

DESCRIPTION

Resolve discrepancy in UP setpoint for Table Elevation MUST
in Hand and Auto modes.

STATUS

Does not impact integrated system testing. Does impact DOP-010A

ADDITIONS TO PUNCH LIST

ITEM NO. _____ WBS NO. _____ DATE _____ SOURCE _____
SYSTEM _____ RESPONSIBLE ENGINEER _____
CATEGORY I-P I-S I-W I-O I-M II

DESCRIPTION

STATUS

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE D3

EXCEPTION/REPAIR LOG

DATE 8/18/92

LOG _____

PROCEDURE NO. TPCN 10 REV. 0 TITLE _____

PROCEDURE SECTION(S) 2.1.2.71 & 2.1.3.77

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Normalized data for table elevations exceed 0.09" from greatest to least. The test procedure's data space do not capture true horizontal plane. The data appears to exceed the acceptance criteria.

TEST CONDUCTOR David M. Chapman

SOLUTION/CORRECTIVE ACTION:

Table elevation deviations in the daily test log provide deviations from the average which is the true horizontal plane. See Daily Test Log for evaluation of level measurements.

David M. Chapman 8/18/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

David M. Chapman 8/18/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 03

EXCEPTION/REPAIR LOG

DATE 8/18/92 LOG 37

PROCEDURE NO. TPCN 10 REV. 0 TITLE _____

PROCEDURE SECTION(S) E.1.3.11.6

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

The third acceptance criteria requires that the RPT was able to load and unload mock-up fuel assemblies into position on the clamping table. Due to the presence of end fittings, jig mode operations were required and wooden planks were used to provide support at the fuel assembly grids.

TEST CONDUCTOR David M. Chapman

SOLUTION/CORRECTIVE ACTION:

None. This is a clarification for the acceptance criteria.

David M. Chapman 8/18/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

David M. Chapman 8/18/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE D3

EXCEPTION/REPAIR LOG

DATE 8/19/92

LOG 38

PROCEDURE NO. TPCN14 REV. 0 TITLE _____

PROCEDURE SECTION(S) 8.1.3.32

CLASSIFICATION OF CHANGE: REPAIR ☒ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Clamping Table Down indication did not illuminate with the table in the down position for W17X17 assemblies. Testing continued insofar as this has no impact on TPCN14 objectives.

TEST CONDUCTOR David M. Chapman

SOLUTION/CORRECTIVE ACTION: Investigate and resolve.

David M. Chapman 9/29/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE Row 1 set point position is subsequently revised for realignment with gripper. Down light now is illuminated at Row 1.

David M. Chapman 9/28/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 03

~~EXCEPTION/REPAIR LOG~~
(OBSERVATION)

DATE 2/19/92

LOG 39

PROCEDURE NO. TPCN 10

REV. 0

TITLE _____

PROCEDURE SECTION(S) N/A

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Time Study Calculation used clamping table elevation speed of 9.76 ipm with times of 0.80 minutes to lower and 0.06 minutes to index (48 seconds and 3.6 seconds respectively). Informal observations made during performance of TPCN 10 produced process control times of 112.01 and 21.94 seconds respectively. Tag made speed lowering while lowering was 5.57 ipm.

TEST CONDUCTOR David M. Chapman

SOLUTION/CORRECTIVE ACTION:

None. Throughput is demonstrated in integrated system testing.

David M. Chapman 2/19/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

David M. Chapman 2/19/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE D3

EXCEPTION/REPAIR LOG

DATE 9/22/92

LOG 40

PROCEDURE NO. 9315-TP-202

REV. 1

TITLE

PROCEDURE SECTION(S) TPCN 10/TPCN 28/step 8.1.3.123

CLASSIFICATION OF CHANGE: REPAIR REDESIGN TPCN#

PROBLEM AND CAUSE:

W17X17 fuel assemblies cannot be placed on a properly configured clamping table due to the presence of the upper end fitting. Measurements indicate that the assembly could be placed on the clamping table in the set-point position without the end fitting. Measurements also indicate that the positioning of the Upper and Lower Clamp Sides is adequate to provide clamp contact with grid and lower end fitting. Fuel center support is adequate.

TEST CONDUCTOR

David M. Chapman

SOLUTION/CORRECTIVE ACTION:

Sign off acceptance criteria based upon field measurements in reference to this exception. Measurements are applicable to both clamping tables per item. Support inadequate. Continue testing accordingly this development.

TEST CONDUCTOR

David M. Chapman
9/22/92
DATE

QUALITY ASSURANCE

DATE

(1)

PROJECT ENGINEER

DATE

(1)

TEST DIRECTOR

DATE

(1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

TEST CONDUCTOR

David M. Chapman
9/22/92

DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 03

EXCEPTION/REPAIR LOG

DATE 9/22/92 LOG 41

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) TPCN 10 Step 2.1.3.131 & 146 Reference RL#15:12 (TP201 RL#6)

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

after relocating down clamp assembly and support saddles to allow for the presence of end fittings, load cell upset for the clamping table is less than setpoint. As per TP201 RL# 6, load cell setpoint had been revised to 125#. (DCN 03E) ~~TP201~~
However, mechanical adjustment of load cell actuator had not been performed. This problem was not clearly identified.

TEST CONDUCTOR W. M. Chao 9/22/92

SOLUTION/CORRECTIVE ACTION:

Perform mechanical adjustment of load cells.

<u>W. M. Chao</u>	<u>9/22/92</u>
TEST CONDUCTOR	DATE
_____	DATE (1)
QUALITY ASSURANCE	DATE
_____	DATE (1)
PROJECT ENGINEER	DATE
_____	DATE (1)
TEST DIRECTOR	DATE

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE Testing successful.

W. M. Chao 9/22/92
TEST CONDUCTOR DATE

TEST PROCEDURE

9315-TP-202

REVISION 1

PAGE D3

EXCEPTION/REPAIR LOG

DATE 9/22/92

LOG 42

PROCEDURE NO. 9315-TP 202

REV. 1

TITLE _____

PROCEDURE SECTION(S) TPN 14 Step 21.3.15B

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Auto Clamping Table at rod row 1 (3.306 inches), failed to get alignment of W17x17 alignment gauge with Pull Head A. The table is about 1/4" too high. Need to recheck homing reference.

TEST CONDUCTOR David M. Chapman 9/22/92

SOLUTION/CORRECTIVE ACTION:

1. Revise testing to eliminate rod in the hole testing due to lack of dwell in the test rod in the gripper.
2. Fabricate new test rods to suppress W17x17 fuel in the test fixture and that can be gripped.
3. Revise rod row setpoints as required for W17x17 fuel assemblies
4. Verify repeatability of homing operation.

David M. Chapman
TEST CONDUCTOR

9/23/92
DATE

QUALITY ASSURANCE

DATE

(1)

PROJECT ENGINEER

DATE

(1)

TEST DIRECTOR

DATE

(1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE Testing app TPCN 24 is completed successfully.

David M. Chapman
TEST CONDUCTOR

9/29/92
DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE D3

EXCEPTION/REPAIR LOG

DATE 9/22/92 LOG 43

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE

PROCEDURE SECTION(S) TPCN 1 & Step 8.1.3.152

CLASSIFICATION OF CHANGE: REPAIR REDESIGN TPCN#

PROBLEM AND CAUSE:
Clamping Table controller sometimes homes at reduced speed (3.75rpm vs 60rpm), operates at reduced speed in Jog mode, and has range error in indication (~6" for 1" move). Power down resets the condition.

TEST CONDUCTOR David M. Chapman 9/22/92

SOLUTION/CORRECTIVE ACTION: Monitor homing operations locally for duration of testing until Controller can be checked out.

David M. Chapman 9/19/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE See OITL 0270
David M. Chapman 10/5/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 03

EXCEPTION/REPAIR LOG

DATE 9/22/92

LOG 44

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) TPCNIU Step 8.1.3.158

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Observed that the Clamping Table drifted down $\approx 1/32"$ when the motor was turned off for jog mode. The position indication did not change. This is an assumed mechanical backlash. Also, the clutch does not set before the motor is turned off.

Further checking indicates that this will have no impact on absolute positions e.g. Row 1 or UP. However, for incremental moves (Row 2-17), the controller increments up a fixed distance from where it is at the moment.

TEST CONDUCTOR W. J. M. Khan 9/22/92

SOLUTION/CORRECTIVE ACTION:

Deal with this problem administratively. If a fault or other situation occurs at row 2 to 17 which causes the motor to go off, then we must return to Row 1 position in the HARTS mode. This will establish absolute reference again. This is to be picked up in SOP CDOP.

W. J. M. Khan 9/23/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

SOP 007 and SOP 010A are made up for revision.
See 010A #271

W. J. M. Khan 9/15/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 03

EXCEPTION/REPAIR LOG

DATE 9/28/92 LOG RL#45
PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____
PROCEDURE SECTION(S) TPCN 24 Step 8.1.3. x25
CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:
Failed to obtain non-interference with extension of pull head A to grip the rod in row 17 of the test fixture. Rod contacted the bottom of the gripper. Wooden grid was loose allowing rod to go out of vertical alignment.

TEST CONDUCTOR David M Chapman

SOLUTION/CORRECTIVE ACTION:
Realigned & released. Added additional rods to hold wooden grid in place. Was successful in getting rod 17 but rod did contact leveled surface at the end of the gripper. This is acceptable.

<u>David M Chapman</u>	<u>9/28/92</u>
TEST CONDUCTOR	DATE
_____	DATE (1)
QUALITY ASSURANCE	DATE
_____	DATE (1)
PROJECT ENGINEER	DATE
_____	DATE (1)
TEST DIRECTOR	DATE

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE Testing as per TPCN 4 completed successfully.
David M Chapman 9/29/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202

REVISION 1

PAGE 03

EXCEPTION/REPAIR LOG

DATE 9/28/92

LOG RL#46

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) TPCW 24 Step 8.13.x28

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

Observed that the test fixture when placed in the South Clamping Table position is about 1/16" lower than the pull head. Table was previously seen to be level using a carpenter's level.

TEST CONDUCTOR Nigel M Chapman 9/28/92

SOLUTION/CORRECTIVE ACTION:

Shim the South Clamping Table Clamp and continue testing. Permanent shimming to be installed after shim thickness is verified.

Nigel M Chapman 9/28/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE Shims 20/1000, OK See GITL 0272, 9/11/92

Nigel M Chapman 9/29/92
TEST CONDUCTOR DATE

EXCEPTION/REPAIR LOG

PROBLEM AND CAUSE:

BLEM AND CAUSE:
When the camera call is made after the alarm acknowledge, cameras 4 & 7 are displayed for the Red Extraction Arms (and Fault alarm which is presented with the torque fault (linked fault)). If the camera call is actuated before the alarm acknowledge, cameras 3 & 7 are displayed. The alarm acknowledge clears the torque fault for the purposes of camera calls. The Fault message remains displayed but this is not relevant to the call camera features.

TEST CONDUCTOR _____

SOLUTION/CORRECTIVE ACTION:

ION/CORRECTIVE ACTION:
accept as is for the purposes of this SOT. Review DCP-024 to do the call camera before the alarm acknowledge.

David M. Chen 9/29/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE _____ DATE _____ (1)

PROJECT ENGINEER _____ DATE _____ (1)

TEST DIRECTOR _____ DATE _____ (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE Dep 024 Section 6.3.1 is marked up for review

Wigil M Phas 9/29/92
TEST CONDUCTOR DATE

See OITL # 268
vrc
10/15/92

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE 03

EXCEPTION/REPAIR LOG

DATE 9/29/92 LOG RL#48

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE _____

PROCEDURE SECTION(S) N/A

CLASSIFICATION OF CHANGE: REPAIR _____ REDESIGN _____ TPCN# _____

PROBLEM AND CAUSE:

On 9/23/92, The Clamping Table's lower proximity sensor was replaced with another. The replacement's cabling is not modified to fit the application.

TEST CONDUCTOR David M. Chapman

SOLUTION/CORRECTIVE ACTION: Continue testing with temporary replacement. Complete cable work at a later date.

David M. Chapman 9/29/92
TEST CONDUCTOR DATE

QUALITY ASSURANCE DATE (1)

PROJECT ENGINEER DATE (1)

TEST DIRECTOR DATE (1)

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

See OSTR # 273

David M. Chapman 10/5/92
TEST CONDUCTOR DATE

TEST PROCEDURE 9315-TP-202 REVISION 1 PAGE D3

EXCEPTION/REPAIR LOG

DATE 9/30/92 LOG RL#49

PROCEDURE NO. 9315-TP-202 REV. 1 TITLE

PROCEDURE SECTION(S) N/A

CLASSIFICATION OF CHANGE: REPAIR REDESIGN TPCN#

PROBLEM AND CAUSE:

Operating in the HAND Mode, one cannot get to the Clamping Table "UP" setpoint position for receiving Fuel. One can increment to "Row 18" which is below "UP" if one increments to "Row 11", drive fault on end-of-travel.

TEST CONDUCTOR

SOLUTION/CORRECTIVE ACTION:

This software problem could prevent fuel processing operations from being performed in the HAND mode. This does not impact Phase III testing. To be resolved in a later phase.

TEST CONDUCTOR 9/2/92
DATE

QUALITY ASSURANCE (1)
DATE

PROJECT ENGINEER (1)
DATE

TEST DIRECTOR (1)
DATE

Notes: (1) Required for redesign

CORRECTIVE ACTION: COMPLETE

See OITL # 274

TEST CONDUCTOR 10/5/92
DATE

APPENDIX E
CCTV ASSESSMENT

CCTV Assessment

1. Operation: (describe type of operation here)

upon initiating 'camera call' on control console,
CCTV coverage required.

2. Camera Assessment

Camera No. 3

Evaluation
(describe the view that the camera is capable of
providing)

Camera 3 can be positioned to provide unobstructed
view of faulted area

3. Recommendations: (Recommend cameras that provide the best view of the system)

Camera 7 not hooked up. (RL #1)

Test Conductor

J. G. Coleman

Date

5/18/92

QA

C. R. Cluggett

Date

5/29/92

CCTV Assessment

1. Operation: (describe type of operation here)

Motor Fault Camera Call Test ITCN 24 Step 8.1.3.260

2. Camera Assessment

Camera No. 3

Evaluation

(describe the view that the camera is capable of providing)

Camera 3 provides good overall view of the Clamping Table and a partial view at the East End of the table elevation drive motor. Part of the MT jib crane obstructs view below the lower clamps when lower clamp assembly is in the W17x17 position. This is not the MT Safe position.

3. Recommendations: (Recommend cameras that provide the best view of the system)

- ① Ensure that the Manipulator Transporter is properly located in a Safe position or that Camera 3 is properly mounted to avoid interference for all fuel types.
- ② Camera 3 is a good selection.

Test Conductor

Date 9/29/92

QA

Date 9/29/92

CCTV Assessment

1. Operation: (describe type of operation here)

Motor Fault Camera Call test TPCN 24 Step 8.1.3.260

2. Camera Assessment

Camera No. 7

Evaluation

(describe the view that the camera is capable of providing)

Camera 7 provides good overall view of the top of the clamping table and is able to provide closeup coverage of clamps and clamp sticks.

3. Recommendations: (Recommend cameras that provide the best view of the system)

Camera 7 is a good selection. However, it may be relocated a little East to get a better view of pull head alignment with fuel rods.

Test Conductor

Date 9/29/92

QA

Date 9/29/92

CCTV Assessment

1. Operation: (describe type of operation here)

TPCW 24 step 2.1.3.262

2. Camera Assessment

Camera No. 9

Evaluation
(describe the view that the camera is capable of
providing)

Camera 9 provides excellent coverage of the Clamping Table everywhere in its normal operating range. Coverage is reduced with the RBT going to the FAHF storage rack but this is not a significant impact since this would not be normal processing when a Clamping Table alarm occurs.

3. Recommendations: (Recommend cameras that provide the best view of the system)

Use Camera 9 as a backup should cameras 3 or 7 fail.

Test Conductor

Date 9/29/92

QA

Date 9/29/92

CCTV Assessment

1. Operation: (describe type of operation here)

TPCW 24 Step 2.1.3.262

2. Camera Assessment

Camera No. 10

Evaluation

(describe the view that the camera is capable of providing)

Camera 10 provides poor coverage due to interference with the FAWF and Tube, depending upon RVT operation.

3. Recommendations: (Recommend cameras that provide the best view of the system)

None. Camera 9 provides adequate backup.

Test Conductor

Michael Chen

Date 9/29/92

QA

[Signature]

Date 9/29/92

HALLIBURTON NUS
Environmental Corporation

TEST PROCEDURE

9315-TP-202

REVISION

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APPENDIX F

TRAINING SIGN-OFF SHEET

NAME (Print)

ERG Forest

Kristjan T. Gunnarsson

THOMAS F MULKREU

FRED G. COLEMAN

Clinton R. Claggett

Virg. IN Chapman

KEITH FULLMER

J. M. Bullo

T. F. MULKREU

G. JEAN PHILIPPE

Gordon J. Cole

SIGNATURE

ERG Forest 5/21/92

Kristjan T. Gunnarsson 5/21/92

THOMAS F Mulkreu 5/21/92

Fred G. Coleman 5/26/92

Clinton R. Claggett 5/26/92

Virg. IN Chapman 8/10/92

Keith Fullmer 8/10/92

Frank Bullo

T. F. Mulkreu

G. Jean Philippe

Gordon J. Cole

**DATE
FILMED**

11/01/93

END