

# WP 05-WH1742

Revision 5

## Hot Cell Bridge Crane 41-T-104

Technical Procedure

EFFECTIVE DATE: 10/01/09

Craig Suggs  
APPROVED FOR USE

**TABLE OF CONTENTS**

INTRODUCTION ..... 3

REFERENCES ..... 3

PRECAUTIONS AND LIMITATIONS ..... 3

PREREQUISITE ACTIONS ..... 5

PERFORMANCE ..... 6

1.0 PREOPERATIONAL CHECKS ..... 6

2.0 OPERATIONAL CHECKS ..... 7

3.0 GRAPPLING A PINTLE ..... 9

4.0 RELEASING A PINTLE ..... 9

5.0 ROTATING THE GRAPPLE ..... 10

6.0 HOT CELL SHIELD PLUG REMOVAL AND INSTALLATION ..... 10

7.0 OPENING MAINTENANCE ROOM SHIELD DOOR 404 ..... 11

8.0 MOVING HOT CELL CRANE INTO MAINTENANCE ROOM ..... 12

9.0 MOVING HOT CELL CRANE OUT OF MAINTENANCE ROOM ..... 13

10.0 CLOSING MAINTENANCE ROOM SHIELD DOOR 404 ..... 14

11.0 CRANE SHUTDOWN ..... 15

## INTRODUCTION <sup>1,2</sup>

This procedure provides the instructions for inspecting and operating the 15-Ton Hot Cell Bridge Crane 41-T-104 at the Waste Isolation Pilot Plant (WIPP).

Performance of this procedure generates the following record(s), as applicable:

- Equipment Logbook

## REFERENCES

### BASELINE DOCUMENTS

- Title 40 CFR §264.15, "General Inspection Requirements"
- DOE Standard 1090-2007, *Hoisting and Rigging*
- DOE/WIPP-06-3174, *Waste Isolation Pilot Plant Remote Handled (RH) Waste Documented Safety Analysis*
- DOE/WIPP-06-3178, *Waste Isolation Pilot Plant Remote Handed (RH) Technical Safety Requirements*
- *15-Ton Capacity Remote Controlled Hot Cell Bridge Crane Operation and Maintenance Manual*

### REFERENCED DOCUMENTS

- WP 04-IM1000, Issues Management Processing of WIPP Forms
- WP 05-WH1743, Bridge Mounted Power Manipulator 41-T-101
- EA04IM1000-1-0, WIPP Form

## PRECAUTIONS AND LIMITATIONS

- Only personnel qualified as Waste Handling Technician/Engineer (WHT/WHE), or trainees under the direct supervision of a qualified WHT/WHE, are authorized to perform the activities specified in this procedure.
- If procedure cannot be performed as written, WHE shall be contacted.

- While operating the crane, the operator must be aware of items in the Hot Cell that interfere with the free travel of the crane and its loads. These include the closed-circuit television (CCTV) cameras, manipulators, power manipulator, tool racks, and various tool stands. Serious damage could result from contact between the crane or its load and the interferences. Care must be taken to maintain visual contact with all parts of the crane below the bridge and trolley during all movements.
- The carriage must **NOT** be aligned with the crane trolley prior to bridging over the Power Manipulator (minimum distance is 4' 6" between centerline of the carriage and trolley).
- A positive grapple connection must be verified prior to each lift by checking that the GRAPPLE FULLY CLOSED status light is on, and if possible, by viewing the grapple position with the aid of a Hot Cell CCTV camera.
- To ensure that the grapple is free from the pintle while raising the grapple following pintle release, the following must be verified:
  - HOIST LOAD indication remains at approximately the grapple weight
  - Load is free from the grapple
- Approximate Weights:
 

Small Shield Plug	5,800 lb
Large Shield Plug	12,040 lb
Large Shield Plug Lift Fixture	800 lb
Facility Canister (Empty)	1,000 lb
Facility Canister (Maximum)	5,000 lb
CNS 10-160B Drum (Maximum )	1,000 lb
Grapple	350 lb
- With the cask unloading room (CUR) shield door open, the hoist will be disabled when it is near the center of the shield plugs north/south and east/west coordinates.
- When the CUR shield door is closed, the hoist operates as normal when near the center of the shield plugs.
- In order to close the Hot Cell shield valve, the hoist must be in the HIGH position. The HIGH position signal comes directly from a geared adjustable intermediate switch on the hoist.
- In order to open the Hot Cell shield valve, the canister shuttle car must be in position X, and the detensioning robot must be in the home position.

- Only one of the three shield valves can be in the open position at one time.
  - 41-N-101 Hot Cell Shield Valve
  - 41-N-165 CUR Shield Valve
  - 41-N-003 Transfer Cell Shield Valve
- In order to open the Hot Cell shield valve, the shield plugs must be installed.
- The redundant drive may be used to operate the bridge, trolley, or hoist, if the normal drive is not working properly.
- The bridge, trolley, and hoist must all be in the same drive selection, main or redundant.
- Safety glasses and a long sleeve 100% cotton shirt must be worn when opening and closing breakers.
- Preoperational checks are to be completed prior to the first crane operation of each shift.
- The selector switch for selecting RADIO or PENDANT controls is located on 41-P-001, in the Hot Cell Gallery.
- Equipment Logbook must be reviewed by WHE on a weekly basis, generally the last day of the workweek.
- After completion of Sections 1.0 and 2.0, the operator may perform other functions (i.e., grapping a pintle, rotating the grapple, releasing a pintle, hot cell shield plug removal/installation) as necessary. These functions are **NOT** required to be performed in order as listed.

## PREREQUISITE ACTIONS

- 1.0 Review Equipment Logbook for outstanding deficiencies and Action Requests (ARs).
- 2.0 Perform the following if a required inspection goes delinquent:
  - 2.1 Immediately notify Site Environmental Compliance (SEC) of the delinquent inspection.
  - 2.2 Schedule and complete inspection.

- 2.3 Document the following in a letter to SEC within five working days:
- 2.3.1 Schedule of inspection
  - 2.3.2 Reason(s) why the inspection was not performed
  - 2.3.3 Any measures taken to offset the negative impacts resulting from not performing the inspection
  - 2.3.4 Actions to prevent further delinquencies
- 2.4 **GO TO** WP 04-IM1000 and determine if a WIPP Form (EA04IM1000-1-0) is required.
- 3.0 WHE, review Equipment Logbook on a weekly basis, generally the last day of the workweek.

## PERFORMANCE

### 1.0 PREOPERATIONAL CHECKS

---

#### NOTE

The inspections in this section can be done from inside the Hot Cell if it is accessible; otherwise, they can be performed as much as possible from outside the cell through shielded windows and by utilizing the CCTVs.

---

- 1.1 Perform the following prior to energizing the crane:
- Ensure wire ropes are wound properly on drum.
  - Ensure rotating block and grapple power cable is wound on take-up reel, taut, and free from damage or wear.
  - Ensure bridge path is clear of obstructions.
  - Ensure trolley path is clear of obstructions.
  - Verify **NO** leakage of oil/grease from crane mechanisms.
  - Check calibration inspection sticker on control console for calibration due date and indicate in Equipment Logbook if inspection due date is less than 30 days away.
- 1.2 Ensure Hot Cell bridge crane disconnect on power distribution panel of 41-P-001 is **OFF**.

**NOTE**

Only the control device that is to be used requires a preoperational check.

**WARNING**

Plugging in energized cables can cause dangerous electrical shock. Ensure circuits are de-energized before plugging them in.

1.3 **IF** pendant is to be used,  
**THEN** ensure pendant cable is plugged into one of the crane OUT OF CELL CONNECTION BOXES.

1.4 Ensure Hot Cell Crane Breaker 41-T-104 on Motor Control Center (MCC) 41P-MCC04/2 is **ON**.

1.5 Place Hot Cell bridge crane disconnect on power distribution panel of 41-P-001 in **ON** position.

**2.0 OPERATIONAL CHECKS**

2.1 Ensure the red E-STOP button is in the OUT position on the controller to be used.

2.2 Ensure the bridge and hoist toggle switches are in the NORMAL position on the controller to be used.

2.3 IF pendant is being used,  
**THEN** perform the following:

2.3.1 Press START button momentarily.

2.3.2 Verify POWER ON light comes **ON**.

2.4 IF using radio controller,  
**THEN** perform the following:

2.4.1 Place ON - OFF switch to **ON**.

2.4.2 Turn key switch to **ON**.

2.4.3 Verify red BATT lamp is flashing, indicating battery is charged.

2.4.4 Press START button.

2.5 Perform the following functions in any order:

- Lower hook block using HOIST control.
- Raise hook block using HOIST control.
- Verify upper limit switch stops block travel.

**CAUTION**

A minimum distance of 4' 6" is required between Hot Cell crane trolley and power manipulator carriage to avoid damage to equipment.

- Move trolley north using TROLLEY control.
- Move trolley south using TROLLEY control.
- Move bridge east using BRIDGE control.

**CAUTION**

Limit switch override switch must be in normal position to prevent damage to bridge crane or building structure.

- Move bridge west using BRIDGE control.
- Ensure bridge travel limit intermediate switch operates to prevent crane from moving into west wall.

**CAUTION**

Careful observation is required to avoid damage to grapple power cable during rotation of block.

- Ensure rotating block operates full travel in both directions.

2.6 Initiate ARs to address any deficiencies that **CANNOT** be corrected by Waste Handling Operations.

2.7 WH, perform the following:

- Notify WHE of any deficiencies discovered during preoperational checks, and status of each (e.g., deficiencies corrected and ARs generated).

- Notify WHE and report status of preoperational checks.
- 2.8 Record the following information in Equipment Logbook:
- Deficiencies noted
  - Corrective actions taken (outstanding/newly generated ARs, etc.)
- 2.9 Enter time, date, and signature in Equipment Logbook to document performance of preoperational checks.
- 3.0 GRAPPLING A PINTLE
- 3.1 Verify GRAPPLE FULLY OPEN light is **ON**.

---

**NOTE**

Approximate weight of grapple is 350 lbs.

---

- 3.2 Lower grapple onto pintle until GRAPPLE CONTACT light comes **ON** and HOIST LOAD digital display goes below grapple weight.
- 3.3 Rotate GRAPPLE OPEN-CLOSE switch to CLOSE position.
- 3.4 Verify GRAPPLE FULLY OPEN light goes **OFF** and GRAPPLE FULLY CLOSED light comes **ON**.
- 4.0 RELEASING A PINTLE

**CAUTION**

Prior to attempting to open grapple, HOIST LOAD display indication must always be equal to or less than grapple weight to ensure load is seated and will not be dropped.

---

**NOTE**

Approximate weight of grapple is 350 lbs.

---

- 4.1 Lower grapple onto pintle until GRAPPLE CONTACT light comes **ON** and/or HOIST LOAD digital display goes below grapple weight.
- 4.2 Rotate GRAPPLE OPEN-CLOSE switch to **OPEN** position.
- 4.3 Verify GRAPPLE FULLY CLOSED light goes **OFF** and GRAPPLE FULLY OPEN light comes **ON**.

4.4 Raise grapple slowly approximately 6".

4.5 Ensure load is actually released by observing following:

- HOIST LOAD indication remains at approximate grapple weight.
- Load is free from grapple.

## 5.0 ROTATING THE GRAPPLE

5.1 Turn BLOCK ROTATE switch CLOCKWISE or COUNTERCLOCKWISE (CW OR CCW) position as required.

5.2 Release BLOCK ROTATE switch when grapple is in CORRECT position.

## 6.0 HOT CELL SHIELD PLUG REMOVAL AND INSTALLATION

---

### NOTE

Large shield plug and small shield plug can be removed simultaneously.

---

### 6.1 Large Shield Plug Removal

6.1.1 Grapple pintle on large shield plug lifting fixture.

6.1.2 Stage large shield plug lifting fixture over large shield plug.

6.1.3 Align lifting lugs on large shield plug lift fixture with lifting lug holes on large shield plug lifting attachments.

6.1.4 Rotate rotating block to attach large shield plug lift fixture to large shield plug lifting attachments.

### CAUTION

A load in excess of 20,000 lb when removing the shield plugs is an indication of shield plug binding which may cause damage to equipment.

6.1.5 Lift large shield plug slowly until it is clear of the Hot Cell floor.

6.1.6 Stage shield plugs in appropriate lay-down area.

**CAUTION**

Prior to attempting to open grapple, HOIST LOAD display indication must always be equal to or less than grapple weight to ensure load is seated and will not be dropped.

6.1.7 Release grapple from large shield plug lift fixture.

**NOTE**

Large shield plug and small shield plug can be installed simultaneously.

- 6.2 Installation of Large Shield Plug
  - 6.2.1 Grapple pintle on large shield plug lifting fixture.
  - 6.2.2 Align lifting lugs on large shield plug lift fixture with lifting lug holes on large shield plug lifting attachments.
  - 6.2.3 Lift large shield plug slowly until it is clear of Hot Cell floor.
  - 6.2.4 Stage large shield plug over large shield plug port.
  - 6.2.5 Lower large shield plug slowly into large shield plug port until shield plug is flush with Hot Cell floor.

**CAUTION**

Prior to attempting to open grapple, HOIST LOAD display indication must always be equal to or less than grapple weight to ensure load is seated and will not be dropped.

6.2.6 Release grapple from large shield plug lift fixture.

7.0 OPENING MAINTENANCE ROOM SHIELD DOOR 404

- 7.1 Obtain control panel key from WHE
- 7.2 Ensure that no equipment is obstructing Shield Door 404.
- 7.3 Perform the following at panel 411-CP-236-26:
  - 7.3.1 Place disconnect on control panel 411-CP-236-26 in **ON** position.
  - 7.3.2 Verify DOOR CLOSED light is **ON**.

- 7.3.3 Place key switch in the **ON** position.
- 7.3.4 Verify red POWER light is **ON**.
- 7.3.5 Depress OPEN pushbutton.
- 7.3.6 Verify OPEN light comes **ON**.
- 7.3.7 Verify CLOSED light goes **OFF** when door is fully open.
- 7.3.8 Place key switch in the **OFF** position.
- 7.3.9 Place disconnect on control panel 411-CP-236-26 in **OFF** position.

## 8.0 MOVING HOT CELL CRANE INTO MAINTENANCE ROOM

- 8.1 Ensure load is not suspended from grapple.
- 8.2 Ensure grapple is removed.
- 8.3 Ensure rotating block is high enough to clear the crane maintenance room floor.
- 8.4 Ensure Maintenance Room Shield Door 404 is fully open.
- 8.5 **IF** bridge drive is operational,  
**THEN** move bridge as follows:
  - 8.5.1 Ensure mechanical stops are in RAISED position.
  - 8.5.2 Place BRIDGE limit switch toggle in WEST BYPASS.
  - 8.5.3 Move bridge into desired location using BRIDGE control lever.
  - 8.5.4 **IF** door is in OPEN position,  
**THEN GO TO** Step 10.0 and close maintenance room door.
- 8.6 **IF** bridge drive is **NOT** operational,  
**THEN** move bridge as follows:
  - 8.6.1 Place 41P-SW04/5 for 41-HM-105 BRIDGE CRANE WINCH RETRIEVAL WINCH MOTOR DISCONNECT in **ON** position.
  - 8.6.2 Place RETRIEVAL WINCH MAIN DISCONNECT in **ON** position.
  - 8.6.3 Place WINCH DIRECTION keylock in **NORMAL**.

- 8.6.4 Place ON/OFF keylock on control pendant in **ON** position.
- 8.6.5 Verify POWER ON light comes **ON**.
- 8.6.6 Ensure bridge hard stops are in RAISED position.
- 8.6.7 Hold pendant START pushbutton to winch bridge into desired position.
- 8.6.8 Place ON/OFF keylock in **OFF**.
- 8.6.9 Place RETRIEVAL WINCH MAIN DISCONNECT (41P-CP04-221) in **OFF** position.
- 8.6.10 Place 41P-SW04/5 for 41-HM-105 BRIDGE CRANE WINCH RETRIEVAL WINCH MOTOR DISCONNECT in **OFF** position.
- 8.6.11 **GO TO** Section 10.0 and close maintenance room door.

## 9.0 MOVING HOT CELL CRANE OUT OF MAINTENANCE ROOM

- 9.1 Ensure Maintenance Room Shield Door 404 is fully OPEN.
- 9.2 **IF** retrieval winch was **NOT** used to move bridge into maintenance room, **THEN** move bridge into Hot Cell using BRIDGE controls on Hot Cell crane control.
  - 9.2.1 **GO TO** Step 10.0 to close Maintenance Room Shield Door 404.
  - 9.2.2 Ensure bridge limit switch toggle in NORMAL.
- 9.3 **IF** retrieval winch was used to move bridge into Maintenance Room, **THEN** perform the following:
  - 9.3.1 Place 41P-SW04/5 for 41-HM-005 BRIDGE CRANE WINCH RETRIEVAL WINCH MOTOR DISCONNECT in **ON** position.
  - 9.3.2 Place RETRIEVAL WINCH MAIN DISCONNECT 41P-CP04/221 in **ON** position.
  - 9.3.3 Place WINCH DIRECTION keylock in REVERSE position.
  - 9.3.4 Place ON/OFF keylock in **ON** position.
  - 9.3.5 Verify POWER ON light is **ON**.

**CAUTION**

Hot Cell crane trolley and Power Manipulator carriage must have at least 4' 6" between center lines to avoid damaging the equipment.

9.3.6 Perform the following concurrently:

- Push and hold START to unwind winch cable as bridge moves into Hot Cell.
- Move bridge into Hot Cell using BRIDGE lever on Hot Cell crane control.

9.3.7 Place bridge limit switch toggle in EAST BYPASS.

9.3.8 Move bridge full travel east through Hot Cell to correctly position retrieval winch.

9.3.9 Return bridge limit switch toggle to NORMAL.

## 10.0 CLOSING MAINTENANCE ROOM SHIELD DOOR 404

10.1 Ensure no equipment is obstructing Door 404.

10.2 Perform the following at Panel 411-CP-236-26.

10.2.1 Place disconnect on control panel (411-CP-236-26) in **ON** position .

10.2.2 Place key switch is in the **ON** position.

10.2.3 Verify red POWER light is **ON**.

10.2.4 Verify DOOR OPEN light is **ON**.

10.2.5 Depress CLOSE push button.

10.2.6 Verify CLOSED light is **ON**.

10.2.7 Verify OPEN light goes **OFF** when door is fully closed.

10.2.8 Place key switch in the **OFF** position.

10.2.9 Place disconnect on control panel (411-CP-236-26) in **OFF** position.

10.2.10 Return key to WHE.

## 11.0 CRANE SHUTDOWN

- 11.1 Ensure no load is suspended from crane or hoist.
- 11.2 Position hoist, bridge, and trolley so they will not interfere with Power Manipulator or present an overhead hazard.
- 11.3 If using radio controller, perform the following:
  - Place ON - OFF switch to **OFF**.
  - Turn key switch to **OFF**.
- 11.4 Verify POWER ON light is **OFF**.