

## **How to move an Arch into or out of the CDF Detector**

This procedure outlines the procedure to be used to move an Arch inside the Collision Hall.

Due to the weight and cost of an Arch, it is required that the head of the Research Division review and approve this moving procedure.

Approvals:

\_\_\_\_\_  
( Safety Committee Head )

\_\_\_\_\_  
( Date )

\_\_\_\_\_  
( CDF Department Head )

\_\_\_\_\_  
( Date )

\_\_\_\_\_  
( Research Division Head )

\_\_\_\_\_  
( Date )

\_\_\_\_\_  
( Accelerator Division Head )

\_\_\_\_\_  
( Date )

**1.0 Controlled Copies of this procedure.**

Two controlled copies of this procedure will exist.

One will be held in the CDF Department Office.

One will be held in the CDF (B-0) Office Complex, Room 171i.

All other copies will be marked, "**INFORMATIONAL COPY ONLY**"

## **2.0 The Procedure.**

### **STEP 1: Identify Key Personnel and their Responsibilities**

2.0.1: Objective: To identify the responsibilities of each individual involved in the movement of the Arch.

2.0.2 Responsibilities:

a). **Co-Ordinator:** will oversee the movement operation from a distance great enough to easily see all personnel and equipment involved in the move and to watch for over-head obstructions. He will report any developing or potential problems to the task leader. At no time will the co-ordinator take over for the task leader. The co-ordinator is there to assist and insure that overall safety is being maintained.

b). **Responsible Engineer:** may be called on to function as the co-ordinator. May also be called upon to solve structural/mechanical problems such as: how to move obstacles, or how to cross gaps in the floor. He will be a structural or mechanical engineer designated by CDF.

c). **Task Leader:** will insure that all personnel under his direction have performed their checks of the equipment and will insure that the equipment is installed properly. He will make certain that his personnel are located in their designated areas before the move begins (to include the co-ordinator or the responsible engineer). He will specify who will operate the equipment such as the hydraulic pump. He will move freely in the work area to insure that the movement of the Arch is slow and completely controlled. His directions will be followed completely and therefore he becomes responsible for the personnel and equipment involved during the move. **NO** movement of the Arch will be conducted without his presence.

d). **Workers:** will install all equipment and will insure that the equipment is serviceable and free from defects. They will guide cables under the arch. They will keep the area clean and free from obstructions. They will move push / pull (double-acting) hydraulic cylinder as necessary and will follow all directions from the task leader.

e). **Hydraulic Pump Operator:** will be qualified to operate the equipment used to push and pull the Arch.. He will follow all directions from the task leader.

f). **Enerpac Hand Hydraulic Pump Operator:** will be qualified to operate the equipment used to raise and lower the Arch. He will follow the directions of the task leader.

g). **Hydraulic Jack Operators:** will be qualified to move and adjust the position of the push/pull jacks and frame. They will keep the area clean and free from obstructions and will follow the directions of the task leader.

h). **Flexible Cable Tray Watcher:** will be knowledgeable in the movement of the Cable Carrier and qualified to operate a personnel lift. His responsibility is to insure that the movement of the Arch does NOT do any damage to the cables or Flexible Cable Tray.

### **STEP 2: Area Preparation**

2.1.1: Objective: The area in which the Arch will be moved, will have all obstacles moved clear of the area and will have the floor completely swept of debris. During the move, the workers will continuously verify that no objects are lying in the movement area. All over-head obstacles will be cleared from the area.

**CAUTION!** Rolling an Arch over loose debris could cause the Hilman Rollers to bind or stop suddenly. This could cause damage to the Hilman Rollers.

### **STEP 3: Key Equipment/Inspection of Equipment**

2.1.3: Objective: To maintain proper performance of equipment for serviceability and safety.

2.1.4 Equipment:

a). **Hydraulic Pump:** will be inspected for leaks, cracks or other defects. The task leader will designate, from the list of trained people, who will check and operate this equipment.

b). **Hilman Rollers:** will be free from defects and will roll easily.

c). **Push / Pull Hydraulic Cylinders:** will be inspected for leaks, cracks or other defects.

### **STEP 4: Placement of Equipment/Personnel**

**NOTE:** While conducting the move, all directions will be given ONLY by the task leader.

a). The Hydraulic Pump Operator should always be in eye or voice contact with the task leader.

- b). The workers will be positioned so that they can identify problems with the hydraulic pancake lifting jacks, Hilman Rollers, hydraulic push / pull jacks and power cables.
- c). The flexible cable tray watcher will be in a personnel lift or on the catwalk at an elevation where he has a clear view of the cable carrier and its movement.
- d). The task leader is free to move around the work area to supervise and give instructions.
- e). The co-ordinator will stay at such a distance to allow himself a clear view of all workers and the entire Arch. Overall safety is his key concern. To avoid confusion among the workers, the co-ordinator communicates to the task leader only.

## **2.2 Across The Floor Operating Procedures**

### **STEP 5: Points to check before beginning Arch move**

2.2.1: Objective: To insure that Arch is ready to move.

**WARNING!** These items **MUST** be checked and confirmed before any lifting or moving operation is performed on the Arch.

2.2.2 Complete Checklist under 3.0.1.

### **STEP 6: Lifting the Arch:**

**WARNING!** Hands and fingers should never be placed between hydraulic jack and arch. Loss of extremities could result.

2.2.3: Objective: To safely raise the Arch on to the Hilman Rollers / pancake hydraulic jacks, via pancake jacks to allow the wall to be moved, using hydraulic push / pull jacks.

2.2.4 Set-up procedure to lift an Arch:

- a). Hook up (1) Enerpac (model P-80) Hydraulic Hand Pump to each East and West set of pancake jacks on the outside of the Arch (total of 2). **NOTE:** Do **NOT** add hydraulic oil to Enerpac P-80

Hydraulic Hand Pump once lift has begun. Be sure to have a pressure readout in the hydraulic circuit.

- b). Install push / pull beam in front of / or under Arch, depending on location of arch before move begins.

**NOTE!** Difference in location is caused by space available to install push / pull beam.

- c). Install push / pull hydraulic cylinder on top of beam.  
d). Lubricate guide rails and Hilman Rollers with WD-40.

#### 2.2.5 Procedure to lift Arch

**CAUTION!** Constantly check clearance between Arch / End Wall Steel and Arch / other Arch. **NOTE: VERY IMPORTANT**, since lead houses will not clear end walls.

**WARNING!** When lead houses are **NOT** covering source drives, the radiation level increases. Only essential personnel should be close to Arch at this time. A film badge and pocket dosimeter are required when in this area.

- a-1). Immediately before **CLOSING** movement begins, remove lead houses that cover radiation source drives on Arch and store lead covers in designated storage container.

**OR**

- a-2) Immediately after **OPENING** movement ends, install lead houses that cover radiation source drives on Arch.

**CAUTION!** Do NOT extend pancake jacks more than 3/4". There are no stops on cylinder, therefore piston may be completely displaced from cylinder.

- b). Lift Arch, using (2) Enerpac P-80 hydraulic hand pumps. Lift Arch until shim packages clear. **NOTE:** Arch should lift at about 1500 PSI. Keep safety shims under corners of Arch, and move shims with Arch.

#### **STEP 7: Moving Arch**

2.2.6 Objective: To safely move the Arch on Hilman Rollers and hydraulic jacks to a new position.

**CAUTION!** Floors may not be level. Keep checking elevation of Arch as movement continues. Raise Arch as necessary.

**CAUTION!** Floors may not be level. Keep chock available for Hilman Rollers. They may continue to run. Always chock Hilman Rollers when changing position of push / pull hydraulic cylinder.

**CAUTION!** Remove side lateral shims before moving arch.

**CAUTION!** Watch for Ribbon Cable interference on lower corners of end wall

**CAUTION!** Continue to check tilt of Arch, to avoid hitting Detector Walls, or adjoining Arch.

**NOTE:** Movement of South Arch may require lifting of Flexible Cable Carrier to avoid interference.

2.2.7 Procedure to move Arch

a). Push / Pull Arch. When push / pull cylinder reaches end of stoke (approximately 9") reset cylinder on beam.

b). When push / pull hydraulic cylinder reaches end of beam, reset beam, to allow further movement. Continue pushing Arch and checking clearances. This operation should require moving and resetting the beam about (3) times.

c). Push / Pull Arch until it is in desired position. **NOTE:** The catwalk may be treated as an ODH 1 area (confirm with RD OD). Therefore, two (2) people may be required to be in notch as the Arch gets close to desired position, to check position of Arch in relation to the Cryostat. If the area is ODH 1. they must follow all required procedures for an ODH class 1 area.

**STEP 8: Lowering Arch**

2.2.8 Procedure to lower Arch

**WARNING!** Hands and fingers should never be placed between shim packs and Arch. Loss of extremities could result.

- a). After Arch reaches final position, slowly lower hydraulic cylinders and place Arch on shim packages.

**NOTE:** If Arch is in operating position, you **MUST** do the following:

- a). Arch **MUST** be run against stops
- b). Bolted clamps **MUST** be installed.
- c). Side lateral shims **MUST** be installed.

**STEP 9: Clean up of equipment and area**

2.2.9 Objective: To properly maintain equipment, properly store equipment and to clean up area.

2.2.10 The task leader will see that all equipment is inspected and all deficiencies repaired.

2.2.11 The task leader will see that the area is cleaned up and free of debris.

**3.0 Checklist:**

3.0.1 Person completing Checklist \_\_\_\_\_ Date \_\_\_\_\_  
(Co-Ordinator)

_____ In	_____ Out
_____ Southwest	_____ Southeast
_____ Northwest	_____ Northeast

3.0.2 The following MUST checked and confirmed before any lifting or moving of operation is performed.

\_\_\_\_\_ Confirm that all gas lines are disconnected (Contact CDF Gas System Engineer or CDF Gas System Supervisor).

\_\_\_\_\_ Confirm that transporter / platform is physically connected to detector, to prevent separation of the (2) units (Task Leader).

\_\_\_\_\_ Check for any additions or changes to Arch that change outside dimensions (Task Leader).

\_\_\_\_\_ Confirm that proper clearances exist (use bolt heads on side of Arch as guide). Any protrusion on side of Arch must be inside these bolt heads. Approximately (1-1/16") (Task Leader)

\_\_\_\_\_ Confirm that all tracks and guides are free of debris (Task Leader).

\_\_\_\_\_ Confirm that lateral shims packages are removed (Task Leader).

\_\_\_\_\_ Confirm that all personnel are wearing personal film badges (Task Leader)

\_\_\_\_\_ Confirm that all lead covers have been removed from Source Drives

#### **4.0 Deviations from the Procedure**

Must be approved by the Responsible Engineer or the Co-Ordinator.

## **5.0 Required Training and Authorized Training Personnel.**

5.0.1 To be an Authorized Instructor, the person must have several years experience in the rigging field. The person must be designated by the Responsible Engineer.

5.0.2 When an Authorized Instructor is present, the operation may declared to be a training session. No previous training is required by the other members of the team

5.0.3 To be a Co-Ordinator: the individual must have a number of years of experience in the rigging field or have been trained by the "Authorized Instructors," in this procedure. The qualifications of this individual are evaluated by the Responsible Engineer or Authorized Instructor.

5.0.4 To be a Task Leader: the individual must have a number of years of experience in the rigging field or have been trained by the "Authorized Instructor," in the procedure. The qualifications of this individual are evaluated by the Responsible Engineer or Authorized Instructor.

5.0.5 To operate Enerpac Hand Pump: the operator is expected to know how to identify problems in operating the system (such as leaks and damaged parts), how to implement the system and how to handle failures. He will demonstrate his ability to the "Authorized Instructor," before being designated as a Enerpac Hand Pump Operator.

5.0.6 To operate Hydraulic Pump: the operator is expected to know how to identify problems in operating the system (such as leaks and damaged parts), how to implement the system and how to handle failures. He will demonstrate his ability to the "Authorized Instructor," before being designated as a Hydraulic Pump Operator.

5.0.7 To operate Hydraulic Jacks ( push / pull ): the operator is expected to know how to identify problems in operating the system (such as leaks and damaged parts), how to implement the system and how to handle failures. He will demonstrate his ability to the "Authorized Instructor," before being designated Hydraulic Jack ( push / pull ) operator.

5.0.8 To watch Flexible Cable Tray: the Flexible Cable Tray Watcher is expected to be qualified to operate a personnel lift. He is expected to keep an eye on cables in the Cable Carrier as they move with the movement of the Arch.

**LIST OF RESPONSIBLE ENGINEERS FOR THIS PROCEDURE**

Name GRIMSON, JOHN ID # 330 .  
Last, First

Name \_\_\_\_\_ ID # \_\_\_\_\_  
Last, First

Name \_\_\_\_\_ ID # \_\_\_\_\_  
Last, First

**LIST OF AUTHORIZED INSTRUCTORS FOR THIS PROCEDURE**

Name GRIMSON, JOHN ID # 330  
Last, First

Name SHOVAN, ROBERT ID # 851  
Last, First

Name \_\_\_\_\_ ID # \_\_\_\_\_  
Last, First

Name \_\_\_\_\_ ID # \_\_\_\_\_.

Last, First

**6.0 Training Materials.**

None at this time.

**7.0 List of Trained People for this procedure.**

The most current copy of this training list must be kept with the controlled copies of this movement procedure. The controlled copies are maintained in the CDF Department Office and the CDF (B-0) Office Complex, room 171i. If the trained individual's name is not on the controlled copy list, then that individual is NOT authorized to operate the specified equipment.

**7.1 Authorized Co-Ordinators:**

ALL AUTHORIZED INSTRUCTORS ARE AUTHORIZED CO-ORDINATORS

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**7.2 Task Leader:**

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**7.3 Hydraulic Pump Operator:**

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#### 7.4 Enerpac Hand Pump Operator

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**7.5 Operate Hydraulic Jacks ( push / pull )**

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**8.0 References and Supporting Documentation.**

None at this time.