



## **Atmospheric Radiation Measurement Climate Research Facility/ North Slope of Alaska/Adjacent Arctic Ocean**

### **NSA Tip Tower Lowering Procedure**

#### **Procedure Summary:**

The tip tower is hinged approximately 6 feet above the ground. A set of weights permanently positioned on the lower portion of the tower are used to counterbalance the weight of the tower as it is lowered. To assist in tower lowering, a nylon line, fastened to the mid-section of the tower, is used to pull the tower downward. In the lowered position, a hinged wood frame supports the top of the tower while instrument maintenance is performed. Following instrument maintenance, the counterweights are used to naturally pull the tower back to an upright position and the attached rope is used to control the ascent of the tower back into the upright position. The following procedure is applicable to both the Barrow and Atqasuk tip towers.

**Required Tools:** Socket Wrench and Open End Wrench (3/4"), large Screwdriver (to clean snow and ice from hinge grooves).

**Required Safety Equipment:** Work gloves. Hardhat is optional.

**Required Number of Personnel:** One or two people.

**WARNING:** Do not perform this procedure during high winds with gusts in excess of 25 mph or in heavily iced conditions. Normally, tower lowering should not be performed when outside temperatures are -10 deg F, or less, in order to prevent flexing damage to tower components and cable. At no time during the lowering procedure should any person stand or walk directly under the tower.

#### **Step-By-Step Directions:**

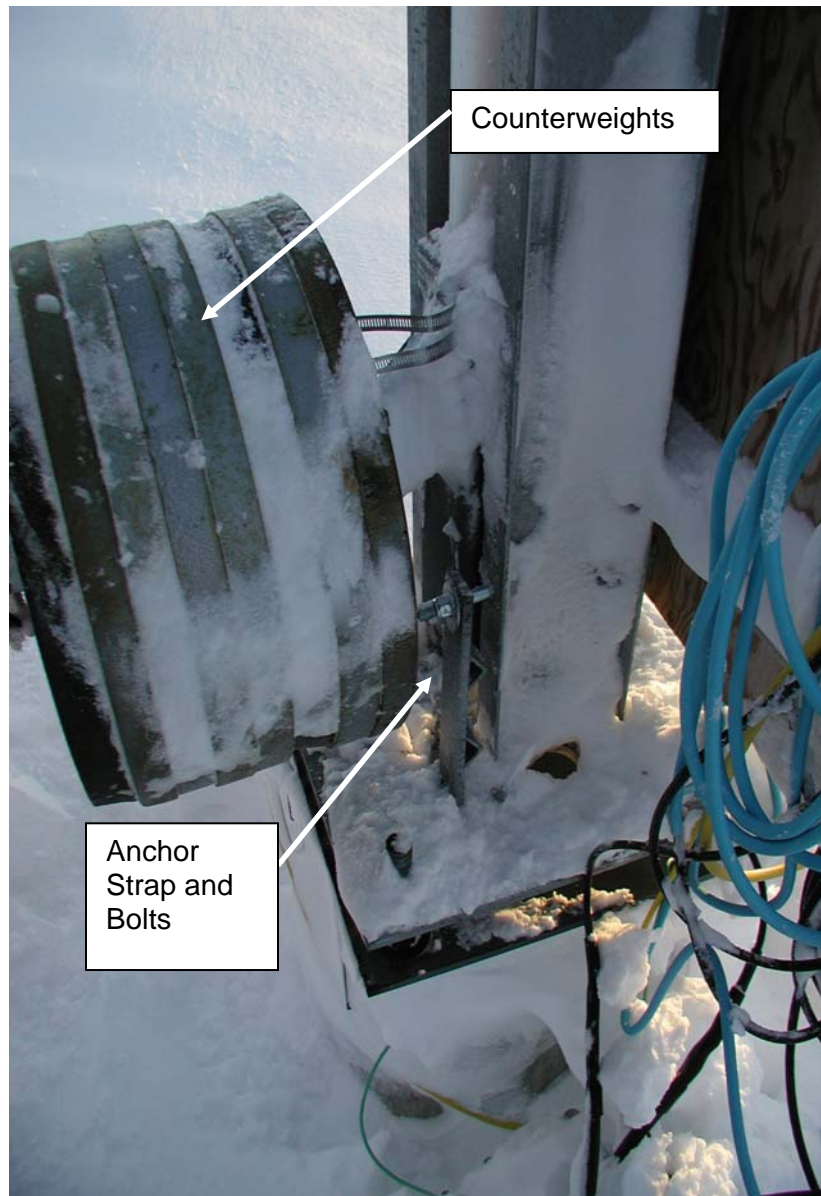
1. Check to insure that eight 45-lb counterweights are positioned and securely fastened onto the arm at the base of the tower (See Figure 2). Eight weights are required for the Barrow tower and 13 weights are required for the Atqasuk tower.

**CAUTION: DO NOT ATTEMPT TO LOWER THE TOWER IF THE REQUIRED NUMBER OF WEIGHTS ARE NOT POSITIONED ON THE COUNTERBALANCE ARM AT THE BASE OF THE TOWER. ATTEMPTING TO LOWER THE TOWER WITH AN INSUFFICIENT NUMBER OF WEIGHTS COULD RESULT IN A HAZARDOUS UNCONTROLLED DESCENT OF THE TOWER AND DAMAGE TO THE TOWER AND ITS SENSORS.**

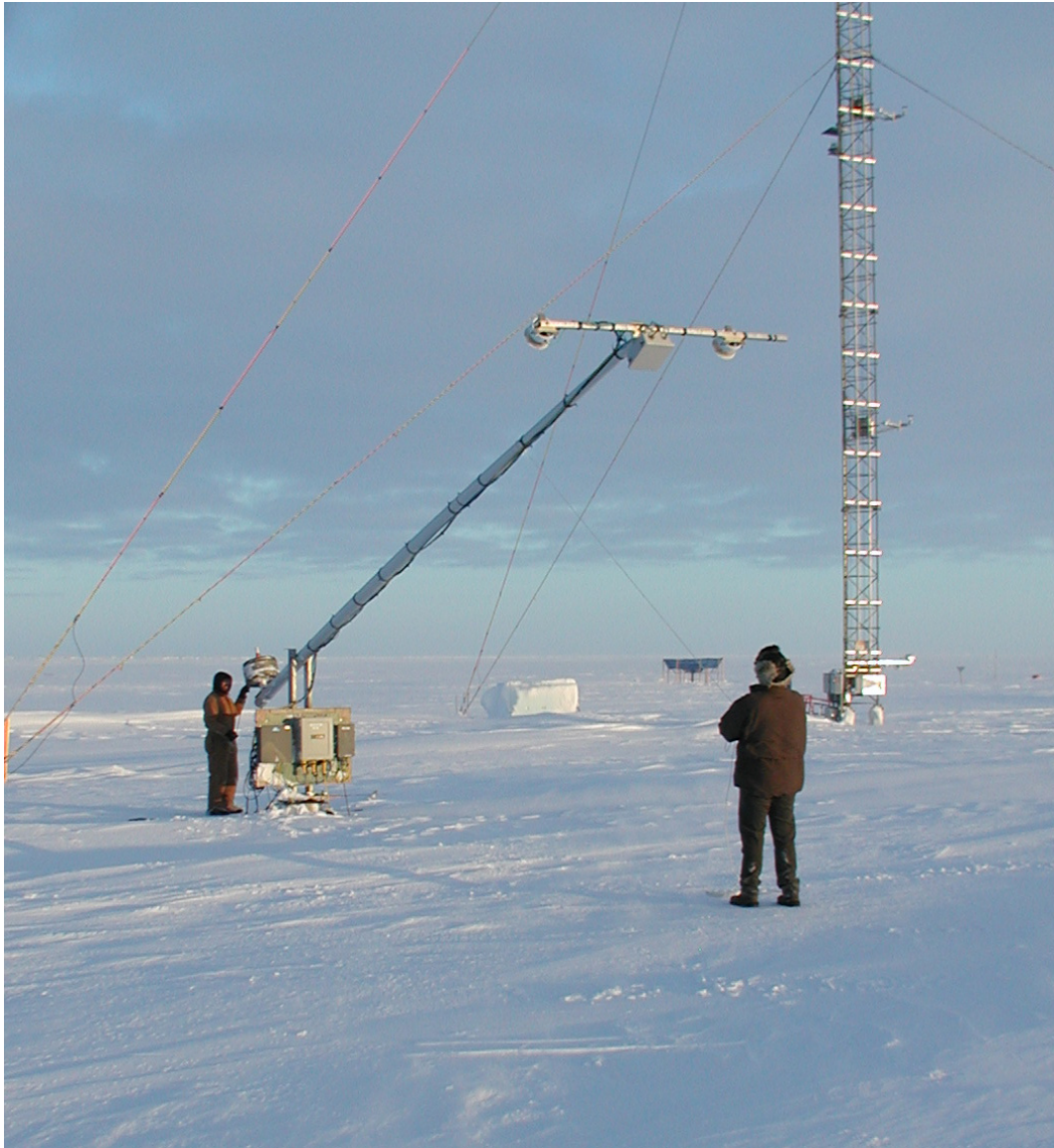
2. Check to see that the wood support frame is at the base of the tower.
3. Place the wood frame support where the top portion of the tower will come to rest after tipping.
4. Clear all snow and ice from the hinge area at the base of the tower (See Figure 1).
5. Uncoil the white nylon pull-down line and check to see that it is free from the pole.
6. Loosen the metal anchor strap near the base of the tower and near the counterweights. (See Figure 2). One bolt must be completely removed; the other must only be loosened.
7. Stand several meters away from the base of the tower and use the nylon line to slowly pull the tower downward. A second person can stand near the counterweights to assist as necessary. The tower pulls down in the direction opposite the counterweights. **KEEP HANDS CLEAR OF THE HINGE AREA AT ALL TIMES AS A PINCH HAZARD EXISTS.**
8. Pull the tower down to a horizontal position and rest it on the wooden support frame. (See Figures 3,4 and 5)
9. In the horizontal position, the tower will tend to upright itself. One person can hold the tower in place while the second person performs instrument maintenance. Alternatively, an extra weight and strap, located near the base of the tower, can be fastened near the top of the tower to hold it in the horizontal position (See Figure 4).
10. To raise the tower repeat Steps 6-8 in reverse order.
11. Make a final inspection of the metal anchor strap to verify that it is positioned correctly.
12. Store the wood frame at the base of the tower and secure the pull-down line to the tower.
13. Be sure to log the procedure and times in OMIS.



**Figure 1** The hinge section of the tower.



**Figure 2 Tower base showing anchor strap and bolts**



**Figure 3 Lowering the tower with the pull-down rope**



**Figure 4** The tower in the lowered position supported by the wooden frame. A counterweight is necessary to hold the tower in the horizontal position.



**Figure 5** The base end of the tower in the lowered position.