

Attachment F

Well and Cavern Closure and Abandonment Plan

**Plan for Plugging and Abandonment
of Class III Solution Mining Wells
and Caverns before Gas Storage**

The following procedures are provided as a general guideline. Actual plugging measures would be submitted in advance to DWQ (prior to commencement of gas storage).

1. At least 45 days before the planned plugging, Magnum will notify the DWQ Executive Secretary of the proposed plugging with a Well Condition Report and a well-specific Plugging and Abandonment Plan.
2. The Well Condition Report will include a discussion of the following:
 - a. The results of the well's most recent mechanical integrity test,
 - b. The location of any leaks or perforations in the casing,
 - c. The location of any vertical migration of fluids behind the casing, and
 - d. The adequacy of casing cement bonding across the salt formation, as determined from cement bond logs run at the time of well construction or just prior to well abandonment.
3. All nitrogen or other blanket material will be removed and the cavern will be filled with saturated brine water.
4. All free hanging tubing will be pulled from the well.
5. The exact depth to the bottom of the cemented production casing will be determined.
6. A drillable plug capable of supporting a cement plug will be installed in the cemented casing with the bottom of the plug within 10 feet of the end of the casing.
7. All cement plugs to be Class G cement with no additives and slurry weight of 14.5 pounds per gallon or more.
8. The entire wellbore from the bridge plug to surface will be filled with cement.
9. In the event the cemented casing is determined to be leaking, the casing will be perforated at the level of the leak and cement squeezed into the perforations.
10. An alternative technique which could be used involves setting the following plugs.
 - a. Bottom plug: A 300-foot plug from the plug at the bottom of the production casing upward.
 - b. Surface casing plug: A 150-foot plug from 75 feet below the bottom of the surface casing upward.
 - c. Top plug: A 50-foot plug from 50 feet below surface grade upward to surface.
 - d. The casing between each of the plugs shall be filled with a noncorrosive mud slurry of at least 10 pounds per gallon weight.
11. Upon completion of the plugging operation, all reports will be filed in accordance with DWQ rules as applicable.

Part L – 16-inch Injection Well Plugging and Abandonment Plan

The following procedures are provided as a general guideline. Actual plugging measures will be submitted in advance to DWQ (prior to commencement of product storage) or DOGM (after commencement of storage operations) for approval.

1. Form DOGM-9 will be submitted (after commencement of product storage) for procedural approval.
2. All stored product will be removed and the cavern will be filled with saturated brine water.
3. All free hanging tubing will be pulled from the well.
4. The exact depth to the bottom of the cemented production casing will be determined.
5. A drillable plug capable of supporting a cement plug will be installed in the cemented casing with the bottom of the plug within 10 feet of the end of the casing.
6. The following plugs will be placed. All cement plugs will be Class G cement with no additives and the slurry weight will be 14.5 pounds per gallon or more.
 - a. Bottom plug: A 300-foot plug from the plug at the bottom of the production casing upward.
 - b. Surface casing plug: A 150-foot plug from 75 feet below the bottom of the surface casing upward.
 - c. Top plug: A 75-foot plug from 75 feet below surface grade upward to surface.
7. The casing between each of the plugs shall be filled with a non-corrosive mud slurry of at least 10 pounds per gallon weight.
8. An alternative technique that could be used involves filling the entire wellbore with cement.
9. Upon completion of the plugging operation, all reports will be filed in accordance with DWQ or DOGM rules as applicable.