Attachment D

Construction and Cavern Development Plan

PART G

Injection Well Construction Plan

Prior to receiving an authorization to drill an injection well in the Permit Area, Magnum will submit to the DWQ for approval by the Utah Division of Water Quality Director a dedicated Cavern Construction and Development Plan (CCDP) for injection wells being drilled for the specific type of storage product (natural gas, CAES, refined products, crude, etc.). This requirement is in accordance with UIC Permit condition Part III D(2). The CCDP will comply with the federal and state regulations 40CFR146.32 and R317-7-10.1(B) for the construction of Class III injection wells, state rules R649-3-6, R649-3-13, R649-3-7.4 for drilling and casing testing, and the industry standard API RP 1170 for the development of natural gas storage caverns. Magnum will also comply with permit conditions that pertain to the drilling and construction of the well and to cavern development.

The purpose of the CCDP is to outline clear processes and procedures for the construction of storage caverns wells (drilling and injection well installation) and development (solution mining) of storage caverns within the Permit Area. The CCDP will provide detailed methods for cavern well construction to include a typical injection well design that will be adapted to the location of each individual injection well at the time of construction. It should be noted that the typical design was previously determined in consultation with both the DWQ and the DOGM, the agency with joint oversight over the drilling of the injection wells and sole oversight over the operations of the storage caverns (Eyermann 2010; PBESS 2010). In addition, this design has been used for the successful construction of the five injections wells that are now owned and operated by NGL Supply Terminal Solution Mining, LLC.

The typical design includes a well head, five cemented casings, and two hanging casing strings. A schematic for this design is provided in Figure H-1.1 of Part H. The injection well is designed to provide a strong foundation for mechanical integrity of both the cavern well and storage cavern during storage operations as well as protect against the potential for groundwater contamination. The cavern well casing design includes three casings designed to protect the USDWs: one surface casing; two water protection casing strings, one cemented in the freshwater zone and the other to the top of the salt; two casing strings cemented into the upper section salt; and, two hanging strings. The two guiding principles of the cavern well design are: 1) to support injection and production from the completed storage cavern at rates between 2,500 gpm and 6,000 gpm; and, 2) sizing the casing to allow for the use of hanging casing strings for solution mining at rates between 2,500 gpm and 6,000 gpm. The various casing strings included in the typical design are therefore sized to withstand foreseeable collapse, burst and tensile forces that might act upon the casing due to these rates.

See note on next page.

In addition, the CCDP will include procedures for the typical installation of an injection well which will be adapted at the time of construction to meet the specific requirements of the well location within the Permit Area. The installation procedures will consist of a general drilling plan with well condition, welding, and cementing protocols and materials specifications. The CCDP will also include a solution mining plan that will described in Part I. Once approved by the Director,

the CCDP will become an enforceable attachment to the UIC Permit and any subsequent changes will have to be authorized by the agency.

Note: In addition to providing protection for USDWs, cemented casing also provides stability for the entire well and protection for the inner most production casing from corrosion through contact with ground water.

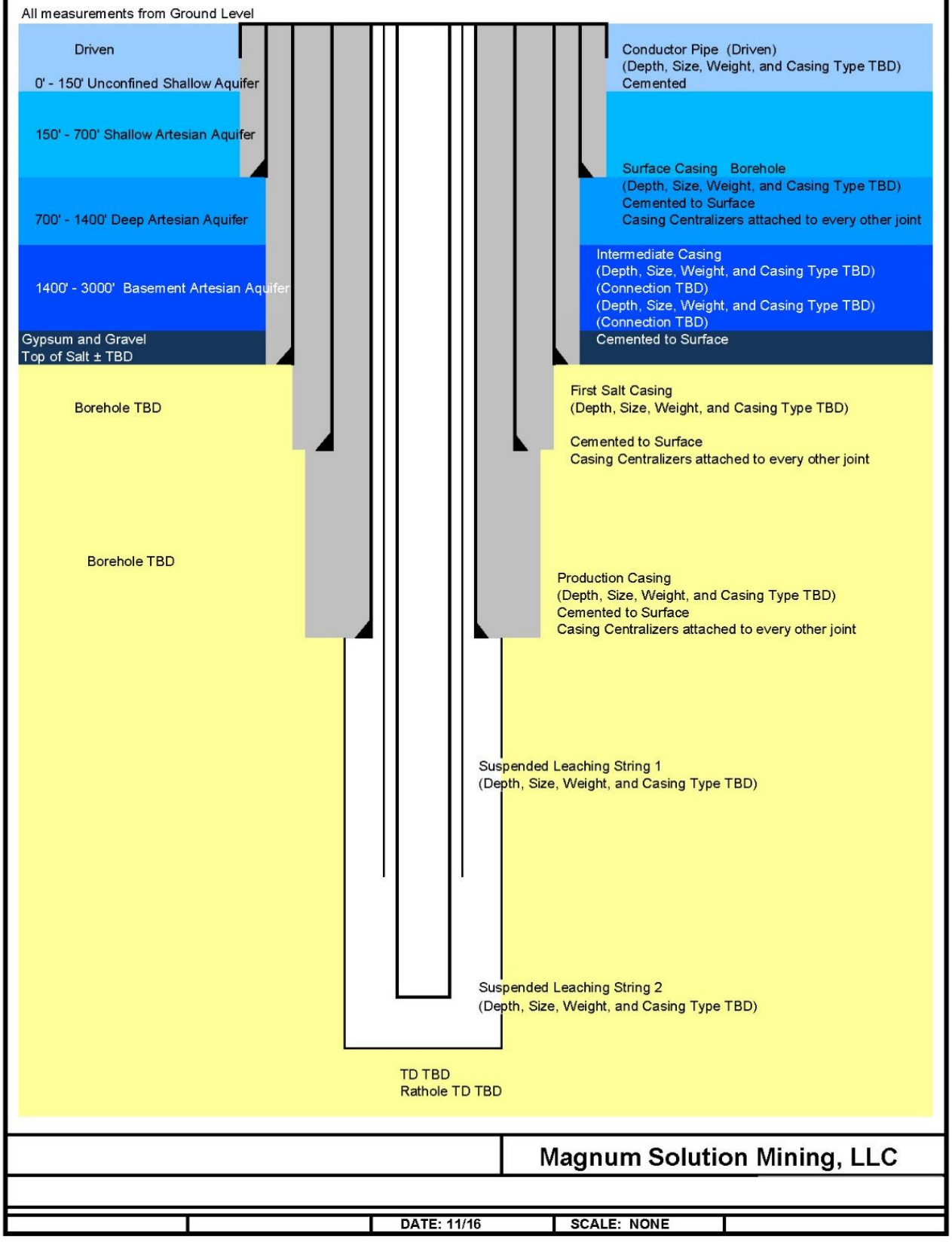
PART H

Injection Well Construction Details

As stated in Part G, prior to receiving an authorization to drill an injection well in the Permit Area, Magnum will submit to the DWQ for approval by the Utah Division of Water Quality Director a dedicated CCDP for injection wells being drilled for the specific type of storage product (natural gas, CAES, refined products, crude, etc.). This requirement is in accordance with UIC Permit condition Part III D(2). The CCDP will include: a schematic for the injection well casing design; a one-line P & ID diagram; a typical cavern well piping plan; and, a storage wellhead schematic.

Figure H-1.1 depicts an injection well casing design schematic for a typical Magnum injection well. This "typical" design was the basis for the five operating injection wells that have been successfully constructed within the salt structure. As described in Part G, the design was determined in consultation with the DWQ and DOGM and includes a well head, five concentric casings cemented to the ground surface, and two hanging strings used for the injection and withdrawal of the stored product. Two of the five casings are drilled directly into the salt and cemented to the surface in order to ensure continuous protection of the groundwater bearing units and USDWs overlaying the salt structure. This design meets all federal and state requirements and industry standards.

Figure H-1.1: Typical Injection Well Schematic



PART I

Injection Well Operation Plan and Procedures

Prior to receiving an authorization to drill a cavern in the Permit Area, Magnum will submit to the DWQ for approval by the Utah Division of Water Quality Director a dedicated Cavern Construction and Development Plan (CCDP) for injection wells being drilled for the specific type of storage product (natural gas, CAES, refined products, crude, etc.). This requirement is in accordance with UIC Permit condition Part III D(2). The CCDP will comply with the federal and state regulations 40CFR146.32 and R317-7-10.1(B) for the construction of Class III injection wells, state rules R649-3-6, R649-3-13, R649-3-7.4 for drilling and casing testing, and the industry standard API RP 1170.

Once approved by the Director, the CCDP will become an enforceable attachment to the UIC Permit and any subsequent changes will have to be authorized by the agency. As described in Part G, the purpose of the CCDP is to outline clear processes and procedures for both the construction of storage caverns wells (drilling and injection well installation) and development (solution mining) of storage caverns within the Permit Area. The CCDP will provide detailed methods for the typical solution mining plan that will be adapted to the location of each individual injection well at the time of construction. It should be noted that a typical design has been previously approved and used for the successful construction of the five injections wells under the DWQ UIC Program that are now owned and operated by NGL Supply Terminal Solution Mining, LLC.

The typical solution mining plan was been developed using a cavern simulation modeling program such as SalGas or SaltCav3D that simulates mining asymmetrically around the well. Both are industry-accepted cavern simulation programs developed for the Solution Mining Research Institute. There are other industry accepted models that can also be used. The model simulates the growth of the cavern during the solution mining process. The basic inputs for the model include: an average insoluble content; the average radii of the well, the depth of the water injection and brine production strings, the depth of product level, water injections rates, and the duration of mining to reach the desired cavern volume or capacity (Eyermann 2010).

In addition to the typical solution mining plan in the CCDP, Magnum will create specific solution mining plans for each individual injection well at the time of construction. These individual plans will be adapted from the typical to account for the location of injection wells within the salt structure. The general solution mining process includes first injecting a “blanket” material into the injection well from the surface to a prescribed level below the final cemented casing shoe. This material is typically nitrogen or diesel and will keep the solution mining activity below the shoe to protect the integrity that shoe and to control the shape and rate of the development of the cavern. Fresh water is then injected through the tubing and circulated in the injection well hole to dissolve salt. Once the fresh water is saturated with salt, the resulting brine is withdrawn from the injection well and stored in an evaporation pond at the surface. When the design volume of the cavern is complete, solution mining will be stopped and a Mechanical Integrity Test (MIT) will be completed to assure the integrity of the cavern. A successful MIT will allow the cavern to be placed into commercial service under DOGM jurisdiction. The solution mining process will be continuously monitored so that modifications to any of the solution mining plan parameters can

be made to account for unanticipated or non-symmetrical growth. Part J provides the details for the monitoring and reporting requirements under the UIC Permit.