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Acronyms and Abbreviations

gpd	gallons per day
gpm	gallons per minute
ID	inner (inside) diameter
ISR	In-Situ Recovery
WDEQ	Wyoming Department of Environmental Quality
WY	Wyoming

MPI.1 JANE DOUGH SITE NUMERICAL GROUND-WATER MODELING

The primary modeling approach used a version of the MODFLOW model to evaluate ground-water flow and drawdown resulting from the planned mining operations. The MODFLOW model was developed by the USGS in 1988 and has been updated and revised several times. MODFLOW-96 (Harbaugh and McDonald, 1996) was used for modeling of the ground-water system at the Jane Dough Project. The names MODFLOW and MODFLOW-96 are used interchangeably in the remainder of the addendum.

MPI.1.1 Jane Dough Project Modeling

MODFLOW-96 was used to model the ground-water flow prior to, during and after operation of the production area(s). A model grid was developed to cover the proposed mine area with a relatively fine grid (50 foot by 50 foot cells) and extending the modeled area with increased cell size to encompass approximately 5,050 square miles. The fine model grid was expanded from that described in Addendum G for the Nichols Ranch area to encompass the Jane Dough mine area. The model injection and production wells were included as well stresses within the fine grid area.

MPI.1.1.1 Model Configuration

The five layer model utilized a confined aquifer type for all five layers, with a series of general head boundaries on the perimeter of the model grid. The initial potentiometric head in each of the five layers was approximated as a uniform gradient across the model grid areas. This surface was developed using the typical gradient of 0.0033 feet/feet. The general gradient is from southeast to northwest. This initial potentiometric surface was the same as that used for the Nichols Ranch area modeling. Because the aquifer is confined, no structural information is necessary to define the ground-water system.

On the periphery of the model grid, selected cells were designated as general head boundary cells to stabilize the potentiometric surface. The head in each of the 107 designated general head boundary cells for each layer was set at the initial model head and the cell conductance was set at a relatively high level to provide a generally stable regional potentiometric surface.

MPI.1.1.1.1 Model Grid

The model grid consists of 439 rows x 244 columns and is rotated approximately 35 degrees counterclockwise from the orthogonal directions. The smallest cell dimension is 50 feet by 50 feet, and the largest cell dimension is 73,895 feet by 73,895 feet as shown in Figure MPI.1-1.

The model grid extends beyond the limits of the Wasatch aquifer on the west and southeast sides of the grid and some of the model cells are inactive. Figure MPI.1-2 presents the cells that are inactive, and also shows the initial potentiometric surface used in the modeling.

MPI.1.1.1.2 Aquifer Properties

The primary aquifer properties information used in the model included transmissivity, storage coefficient, and vertical conductance. The transmissivity and storage coefficient were distinct

for each of the five layers primarily as a function of the typical layer thickness. Three distinct ore zones are identified in layers three, four, and five. These ore-bearing intervals are hereafter described as upper, middle, and lower ore zones. The transmissivity of layers one, two, and four was set at 10.0 ft^2/day (75 gal/day/ft). The transmissivity of layers three and five was set at 8.4 ft^2/day (63 gal/day/ft). The storage coefficient for layer one was set at 6E-05 and the storage coefficient for layer two was set at 5E-05. The storage coefficient of layers three and five was set at 2E-05 and the storage coefficient of layer four was set at 3E-05. These values of storage coefficient were adjusted from the composite storage coefficient for the A sand to reflect the individual sand thicknesses. Layer one represents the lower interval of the B sand and layer two generally represents the upper interval of the A sand above the ore zones.

The vertical conductance between layers is specified by the term VCONT which is the vertical hydraulic conductivity divided by the thickness between the layers and has units of day^{-1}. Because vertical continuity is profoundly reduced by even a thin layer of low permeability material, the effective values of VCONT primarily reflect the presence of shale and siltstone layers within the sequence of ore bearing sands and sandstones. There is a significant thickness of siltstone or mudstone between the A and B sands over the majority of the mining area. However, the mudstone is not present in the Jane Dough Production Area #2, and the vertical conductance between the A and B sands is expected to be significantly greater where this mudstone is absent. VCONT was set at 5E-08 day^{-1} for the interface between layers one and two and the interface between layers two and three where the mudstone is present. Where the mudstone is missing, VCONT was increased by two orders of magnitude to 5E-06 day^{-1} for the interface between layers one and two and the interface between layers two and three. VCONT was set at 1E-06 day^{-1} for the remaining layer interfaces.

MPI.1.1.1.3 Model Setup and Stabilization

The model setup and evaluation of model stability included reviewing changes in the potentiometric surface within the modeled area over the model runs. As discussed previously, the initial potentiometric surface was a uniform gradient across the entire model area as shown in Figure MPI-2 with the same head in each of the five layers. The specified head and conductance in each general head boundary cell on the periphery of the model grid was adjusted until a relatively stable potentiometric surface was maintained over the model grid. As the five modeled layers represent the confined A and B sands the potentiometric surfaces are controlled primarily by horizontal ground-water flow through the project area; and the model was configured to give a simple representation of this ground-water system. A very small recharge rate was included in the model, but it had no significant impact on potentiometric surfaces. The model grid was also extended a large distance beyond the project area to avoid model boundary effects on the prediction of drawdown in the production area.

MPI.1.1.1.4 Production Area Configuration

The proposed mining sequence includes two distinct production areas with an anticipated mining period of three years for Production Area #1 and a mining period of fifteen months for Production Area #2. The modeled period also included the operation of two production areas in the Nichols Ranch area for a total of three years prior to mining at Jane Dough. The results of the modeling for the Nichols Ranch production areas are presented in Addendum 3B. Each production area consists of a combination of staggered recovery and injection wells arranged

generally in a line drive layout for the sinuous ore body. There are areas in the ore bodies where the wells are arranged in a general 5-spot pattern. Number of wells and well locations is preliminary and may be adjusted with further delineation of the ore bodies. The well locations for the modeling are also adjusted to correspond with the center of the model cell, and the actual location may differ from the model location by up to 35 feet. Several model runs were conducted to evaluate general production area operation, and excursion control and retrieval. For the purposes of presentation, both production areas are shown with a bounding line for the upper, middle, and lower ore zones in Figures MPI.1-3, MPI.1-4, and MPI.1-5, respectively. The middle ore zone represents the largest ore body within the project area for both Production Area #1 and Production Area #2.

MPI.1.1.1.5 Operational Parameters

The anticipated recovery rate from the Production Area #1 wells is approximately 10.4 gpm. A total of 337 recovery wells were included in the full Production Area #1 operation with all wells in the middle ore zone. Total recovery rate was 3,499 gpm. Injection well operational rates ranged from 1.4 to 8.7 gpm with a total of 591 injection wells. Excess recovery or wellfield bleed rate was set at 1% of total production with a resulting injection rate of 3,465 gpm.

The anticipated recovery rate from the Production Area #2 wells is 18 gpm. A total of 195 recovery wells were included in the full Production Area #2 operation with 20 wells in the upper ore zone, 131 wells in the middle ore zone, and 44 wells in the lower ore zone. Total recovery rate was 3,500 gpm. Injection well operational rates ranged from 3.2 to 17.1 gpm with a total of 356 injection wells, with 40 wells in the upper ore zone, 235 wells in the middle ore zone, and 81 wells in the lower ore zone. Excess recovery or wellfield bleed rate was set at 1% of total recovery with a resulting injection rate of 3,464 gpm.

MPI.1.1.1.6 Stress Periods

Numerous stress periods were included to allow comparison of predicted aquifer response to the production area operations at several times during the simulation period. A transient simulation also requires very small computational time steps after each significant change in aquifer stresses including startup or shutdown of well operation. This is necessary to prevent a failure to converge in the model computation. The initial stress period was set at a very small value (0.0001 day with 5 time steps) to produce a model output result that essentially reflects initial head conditions. The stress period lengths were then gradually increased until there was a significant change in model stresses, at which point the sequence reverted to a short stress period followed by gradually increasing stress period lengths. A total of 20 stress periods were used in a total simulation period of 10.25 years which included 1.5 years of operation of each production area in the Nichols Ranch area, three years of operation of Jane Dough Production Area #1, 1.25 years of operation of Jane Dough Production Area #2, and a three year period of post-mining recovery. The Nichols Ranch production areas are included in the model sequence to provide a more complete sequence of stresses from mine operation, but the results are described in Addendum 3B and are not repeated in this addendum.

MPI.1.1.2 Model Results

The MODFLOW model produces output in terms of predicted drawdown or predicted head at selected times within the simulation. The drawdown or water-level rise is calculated as the difference between head at a selected time and the initial head for the aquifer at the start of the simulation. Both results are useful in the interpretation of aquifer response to the mining and are used to evaluate the modeling predictions.

MPI.1.1.2.1 Production Area #1

The configuration for Production Area #1 includes wells in the middle ore zone as shown in Figure MPI.1-4. The modeled potentiometric surface for all layers prior to the start of mining is presented Figure MPI.1-2. The mining operation of the recovery and injection wells is expected to continue for 36 months, after which mining of Production Area #2 begins. Figure MPI.1-6 presents the predicted drawdown contours for layer four of Production Area #1 after one year of operation. Figure MPI.1-7 presents the predicted water-level elevation contours for layer four of Production Area #1 after one year of operation. The operation of the production area at a wellfield bleed rate of 1% of the planned 3,500 gpm recovery rate has resulted in development of a significant cone of depression around the operating production area. There is also significant residual drawdown in the Nichols Ranch mining area. The area of gradient reversal in layer four extends approximately 3,000 feet to the northwest of the southwestern portion of the Production Area #1 ore body.

MPI.1.1.2.2 Production Area #2

Production Area #2 consists of injection and recovery wells in the upper, middle, and lower ore zones as shown in Figures MPI.1-3, MPI.1-4, and MPI.1-5. Because the generally sinuous ore bodies are in the same area, there may be up to three wells completed in a single planar cell. The operation of Production Area #2 will begin after mining is completed in Production Area #1. In Production Area #2, the expected middle zone recovery constitutes 2,351 gpm of the total three layer production area recovery rate of 3,500 gpm. Because the majority of the production is from the middle ore zone, the drawdown and gradient reversal is evaluated primarily in this layer. Figure MPI.1-8 presents the predicted potentiometric surface after 15 months of operation in Production Area #2. The area of gradient reversal to the northwest of the production area extends more than 2,500 feet from the production area.

MPI.1.1.2.3 End of Mining

The predicted end of mining water levels and water-level changes are reflected in Figures MPI.1-8 through MPI.1-13. The planned Jane Dough area ISR project includes two adjacent production areas operated in sequence for a total period of 51 months. The area of the production areas is similar, but Production Area #1 has a larger number of operating wells. The mining operation for Production Area #1 is in the middle ore zone (layer four) and a large fraction of the total recovery rate for Production Area #2 is in the middle ore zone. The cone of depression for the middle and lower ore zones is similar at the end of 15 months of operation of Production Area #2 (see Figures MPI.1-12 and MPI.1-13).

MPI.1.1.2.4 Extent of Drawdown

The drawdown in the middle and lower ore zones at the end of mining is presented in Figures MPI.1-12 and MPI.1-13, respectively. The middle ore zone represents significantly more than one-half of the total production area recovery rate, and when the proportioning of the aquifer storage to the ore sand thickness is considered, this ore zone represents the maximum drawdown impact on the aquifer. The extent of the drawdown is relatively large with a five foot drawdown contour extending approximately 7.5 miles to the north or northwest from the central Jane Dough mining area. The drawdown cone is elongated to north and slightly to the west and this is attributed to the mining in the Nichols Ranch area prior to mining at Jane Dough. The extent of drawdown in the lower ore zone is generally similar to that of the middle ore zone (see Figure MPI.1-12) with some residual drawdown from the mining in the Nichols Ranch area.

The predicted drawdown in the upper ore zone of the Jane Dough mining area is significantly less than that of the middle and lower ore zones because only limited production occurs in the upper ore zone for Production Area #2 (see Figure MPI.1-11). However, several feet of drawdown is predicted over a large area and this drawdown results from a combination of mining in Production Area #2, vertical communication with the middle ore zone, and mining in the Nichols Ranch area. The drawdown in the upper ore zone (layer three) also results in predicted drawdown in overlying layers two and one, and the greatest drawdown is within the area of increased vertical communication where the mudstone is absent. This predicted drawdown for the lower B sand (layer one) is presented in Figure MPI.1-9. The predicted drawdown for the upper A sand (layer two) is presented in Figure MPI.1-10.

MPI.1.2 Production Area #1 Excursion Control and Retrieval

The potential for excursion was considered in a MODFLOW-96 modeling scenario by adjusting modeling parameters to produce a temporary and local imbalance in production area operation. The imbalance involves either insufficient recovery rate or excess injection rate for a local area such that the local wellfield bleed rate is zero or actually negative representing more injection than recovery. Limiting this condition to a local area of a few wells is considered appropriate because a wider scale imbalance with insufficient bleed is unlikely given continuous monitoring of recovery and injection rates.

Simulation of retrieval of an excursion is essentially a reversal of the process that created the excursion. Increasing the effective wellfield bleed rate for a local area will increase the local drawdown and cause an expansion of the area of gradient reversal. Within this zone of gradient reversal, ground water will be flowing to the recovery wells and any ground water that has been impacted by mining fluids will be retrieved.

MPI.1.2.1 MODFLOW Modeling Changes

The MODFLOW-96 modeling configuration described in Section MPI.1.1.1 was used for the simulation of excursion and retrieval. The model included operation of Production Area #1 with adjustment of recovery rates from two wells in the middle ore zone to create a local imbalance resulting in excursion, followed by overproduction to affect retrieval. In the simulations, the rate adjustments were preceded by a period of normal production area operation.

The production area operation simulation included a 60 day period of normal operation with a 1% wellfield bleed rate followed by a period of local imbalance. In order to simulate a local imbalance, the extraction rate for two middle ore zone recovery wells in the southwestern portion of the production area was reduced by 5.0 gpm/well for a 60 day period. This was followed by a 60 day stress period in which the extraction rate for the two designated wells was increased by 5.0 gpm/well. This is a significant change in the well recovery rate for the two wells, but only resulted in a wellfield bleed rate range of 0.7 to 1.3% of total production area recovery rate. The operation for all other wells was unchanged from the previous simulations.

MPI.1.2.2 60 Day Excursion and Retrieval Simulation

The results of a MODFLOW-96 simulation of 60 days of normal production area operation are presented in Figure MPI.1-14. The cone of depression around the production area is expanding, and on the potentiometric surface is generally convergent to the production area. At the end of the initial 60 day period, the recovery rates were reduced for two wells within the area indicated in Figure MPI.1-15. At the end of 60 days with this local imbalance, there is a significant zone where gradient reversal has been lost on the west side of Production Area #1. This area where there is a potential excursion is over 900 feet wide and extends a distance of more than 1,200 feet from the production area (see Figure MPI.1-15). The reduction of recovery rates for this simulation has resulted in significant gradient away from the production area and significant potential for excursion. Based on the surface presented in Figure MPI.1-15, the potential excursion of mining fluids would be spread over a width that is much larger than the planned spacing for monitoring ring wells. Figure MPI.1-16 presents the potentiometric surface after an additional 60 day stress period with increased well recovery rates to offset the smaller rates during the period of imbalance. A strong gradient reversal has been regained and extends over 1,000 feet to the northwest of the production area. This indicates that retrieval will be effective, and could occur at moderate rates under strong gradients.

MPI.1.2.3 Discussion of Excursion Simulation

The excursion and retrieval simulations indicate that potential excursion conditions will be produced under local but rather severe production area imbalances. The confined aquifer conditions contribute to relatively rapid changes in gradients and gradient reversal with imbalance or overproduction. The width of the zone over which gradient reversal is lost is also relatively wide at over 900 feet. Mining fluids that are migrating away from the active production area will be spread over a width that is approaching the width of the area where gradient reversal is lost, and there will be additional flare as the impacted ground water moves away from the production area. This indicates that the anticipated monitoring ring well spacing of 500 feet will be sufficient to detect potential excursions.

MPI.1.3 Production Area #2 Excursion Control and Retrieval

The potential for excursion in Production Area #2 was evaluated in essentially the same manner as that for Production Area #1 as described in Section MPI.1.2. A temporary and local imbalance was created by reducing production rates for a period of 60 days followed by a period of overproduction to affect retrieval of the excursion.

MPI.1.3.1 MODFLOW Modeling Changes

The MODFLOW-96 modeling operational sequence included a 60 day period of normal operation with a 1% wellfield bleed rate followed by a period of local imbalance. The imbalance was created by reducing the extraction rate for two middle ore zone recovery wells in the central portion of the production area by 5.0 gpm/well for a 60 day period. This was followed by a 60 day stress period in which the extraction rate for the two designated wells was increased by 5.0 gpm/well. This is a significant change in the well recovery rate for the two wells, but only resulted in a wellfield bleed rate range of 0.7 to 1.3% of total production area recovery rate. The operation for all other wells was unchanged from the previous simulations.

MPI.1.3.2 60 Day Excursion and Retrieval Simulation

The results of a MODFLOW-96 simulation of 60 days of normal production area operation are presented in Figure MPI.1-17. The cone of depression around the production area is expanding, and on the potentiometric surface is generally convergent to the production area. At the end of the initial 60 day period, the recovery rates were reduced for two wells within the area indicated in Figure MPI.1-18. At the end of 60 days with this local imbalance, there is a significant zone where gradient reversal has been lost on the west side of Production Area #2. This area where there is a potential for excursion is over 1,200 feet wide and extends a distance of more than 1,000 feet from the production area (see Figure MPI.1-18). The reduction of recovery rates for this simulation has resulted in significant gradient away from the production area and significant potential for excursion. Based on the surface presented in Figure MPI.1-18, the potential excursion of mining fluids would be spread over a width that is much larger than the planned spacing for monitoring ring wells. Figure MPI.1-19 presents the potentiometric surface after an additional 60 day stress period with increased well recovery rates to offset the smaller rates during the period of imbalance. A strong gradient reversal has been regained and extends over 1,500 feet to the southwest of the production area. This indicates that retrieval will be effective, and could occur at moderate rates under strong gradients.

MPI.1.3.3 Discussion of Excursion Simulation

The excursion and retrieval simulations for Production Area #2 indicate that potential excursion conditions will be produced under local but rather severe production area imbalances. The confined aquifer conditions contribute to relatively rapid changes in gradients and gradient reversal with imbalance or overproduction. The gradient away from the wellfield can be relatively strong with the local imbalance, but a strong retrieval gradient can be achieved with significant overproduction to correct the temporary imbalance. The widths and areas of simulated excursion conditions also indicate that a monitoring ring well spacing of 500 feet will be sufficient to detect potential excursions.

MPI.1.4 Flare Evaluation

The estimation of flare in the Jane Dough production areas is based on estimation of flare at the Nichols Ranch Production Area #1 as described in Addendum 3B. The ore bodies in the Jane Dough area are similar to those in the Nichols Ranch area, and the general wellfield configurations reflect these similarities. Three ore intervals are planned to be mined at both Nichols Ranch and Jane Dough and the middle ore zone is the primary production interval. In comparing middle ore zone well patterns at the two sites (see Figure MPG.1-4 of Addendum 3B

and Figure MPI.1-4), the ore bodies are long narrow and sinuous. The typical middle ore body width at the Jane Dough Project is slightly greater than that at the Nichols Ranch Project and, in general, an increase in the ratio of width to length of narrow ore bodies will reduce the horizontal flare. Hence, although the ore body width differences are small, the Nichols Ranch horizontal flare estimates should be conservatively large when applied to the Jane Dough production areas.

The estimation of vertical flare is typically based on industry experience and some interpretation of the stratigraphic sequence and corresponding hydrologic properties that may limit vertical fluid movement. Vertical permeability or hydraulic conductivity within the ore bearing sedimentary strata is typically dramatically smaller than the horizontal permeability. Shales, mudstones, and siltstones within the stratigraphic sequence can also dramatically limit vertical fluid movement even when the layers are very thin or have limited continuity.

A vertical gradient away from the production interval can occur in the immediate vicinity of injection wells, but the bleed from the production interval causes an overall depression in the production area potentiometric surface. With this depression, the typical vertical gradient in the wellfield is toward the production interval and a reversal of this vertical gradient away from the production interval usually only occurs in the immediate vicinity of the injection wells. Because the injection head dissipates dramatically at a small distance from the injection well, the area where vertical excursion can occur is a relatively small fraction of the overall production area.

MPI.1.4.1 Horizontal Flare Evaluation

As shown in Figure MPG.1-15 of Addendum 3B, the lixiviant does flare beyond the boundary of the ore body. This horizontal flare is quantified as the ratio of the area contacted by the injectate to the area of the ore body under production area pattern. The area contacted by the injectate is represented by the contour line where there is a 0.5 unit concentration increase over the background concentration of 1.0. The ratio of the area within the 1.5 concentration contour to the area of the ore body within the well pattern is 1.19 and this is considered the horizontal flare factor. As discussed previously, this flare factor is considered applicable for the Jane Dough project area with a modest degree of conservatism.

MPI.1.4.2 Vertical Flare Estimation

As discussed above, the estimates of vertical flare are generally derived from industry experience and comparison with observed flare for similar operational conditions. The composite flare factor of 1.45 used in the Nichols Ranch Project area included the horizontal flare factor of 1.19 and approximate vertical flare factor of 1.22. This vertical flare factor was estimated for the Hank Project area and is also generally consistent with industry estimates. The composite flare factor of 1.45 which includes vertical flare is considered appropriate for the Jane Dough Project area given the similarities to the Nichols Ranch Project.

MPI.1.4.2.1 Qualitative Estimate of Vertical Flare

In order to further support the preceding estimate of vertical flare, the MODFLOW model results at the end of production from Production Area #2 were used to make a comparison of potentiometric surfaces in the five layers. If the operation of any injection well(s) in a production interval causes the head in the production interval to exceed that of the overlying

model layer, fluids can potentially flow vertically upward over the area where the head around the injection well(s) exceeds that of the overlying layer. The same relationship exists for the production interval and the underlying layer. Because each production interval and the two overlying zones are modeled as single layers in MODFLOW, this approach does not allow a refined quantitative assessment of vertical fluid migration. However, the comparison of potentiometric surfaces does allow at least a qualitative estimation of the portion of the operating wellfield area where the vertical gradient is from the production zone to an overlying or underlying layer.

Because roughly two-thirds of the Production Area #2 operating wells are in the middle ore zone (layer 4), the vertical flare from the middle ore zone constitutes the majority of the vertical flare. A comparison of potentiometric surfaces between the lower B sand (layer 1) and the upper A sand (layer 2) indicates that head in layer 1 is equal to or greater than that in layer 2 at the end of Production Area #2 mining. This indicates that no vertical flare is expected to extend from production in the upper ore zone (layer 3) up to layer 1.

The composite wellfield in the middle ore zone (layer 4) represents approximately two-thirds of the total production in Production Area #2. In comparing the potentiometric surfaces for layer 4 and layer 3, the approximate area (within the operating layer 4 wellfield[s]) where the head in layer 4 exceeds that of layer 3 is roughly 10 to 11 percent of the operating wellfield area. This can be interpreted qualitatively as the area where vertical upward flare could occur. The downward vertical flare from layer 4 to the lower ore zone (layer 5) is expected to be generally similar to the upward vertical flare. With a combination of upward and downward vertical flare from the middle ore zone occurring over an estimated at 20 to 22 percent of the operating wellfield area, the equivalent qualitative vertical flare factor is reasonably consistent with the value of 1.22 discussed earlier. There will also be vertical flare from the upper ore zone and lower ore zone and this analysis should be generally applicable for the three production intervals.

MPI.2 REFERENCES

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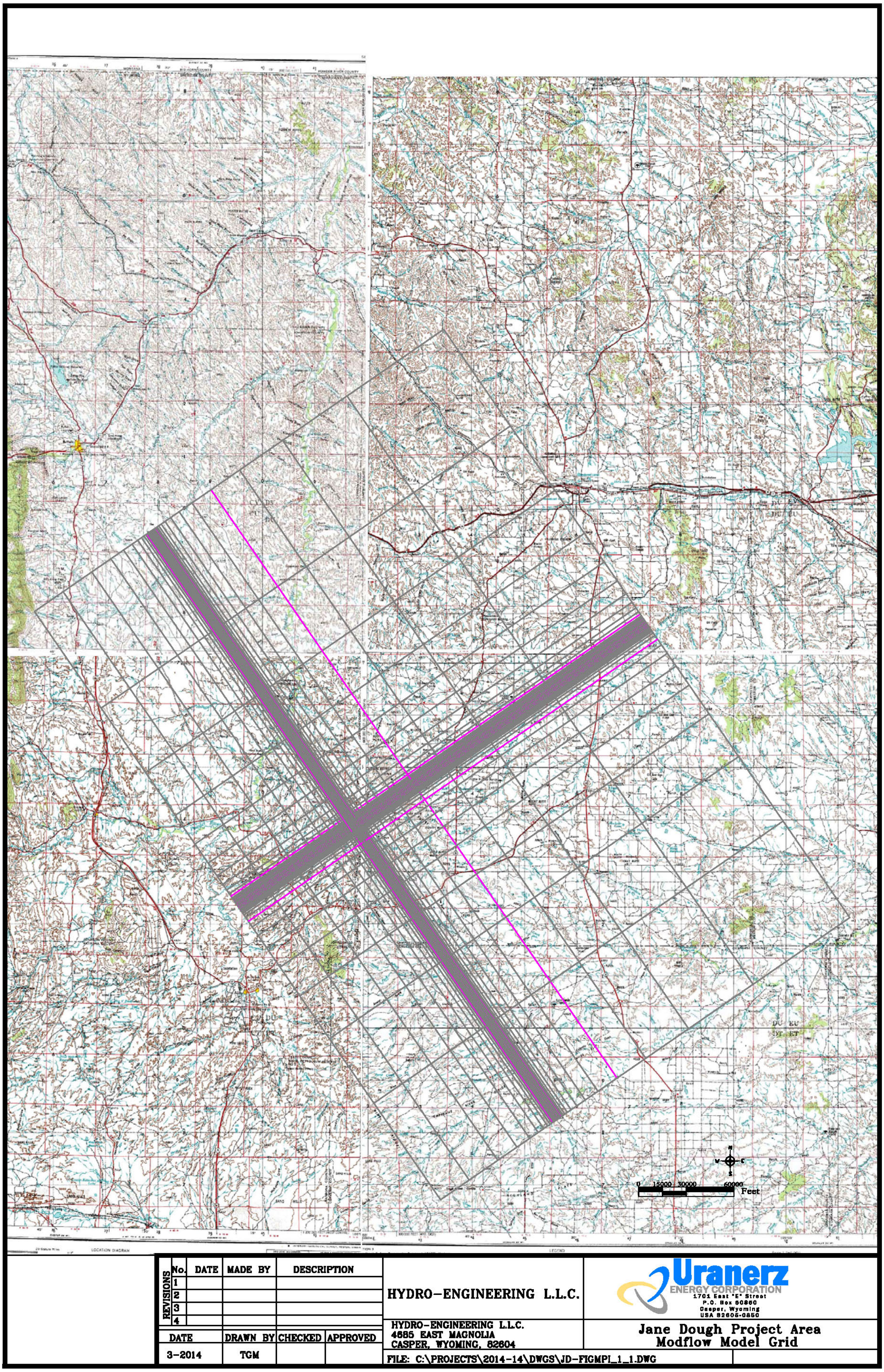

Figure MPI.1-1. Jane Dough Project Area MODFLOW Model Grid.

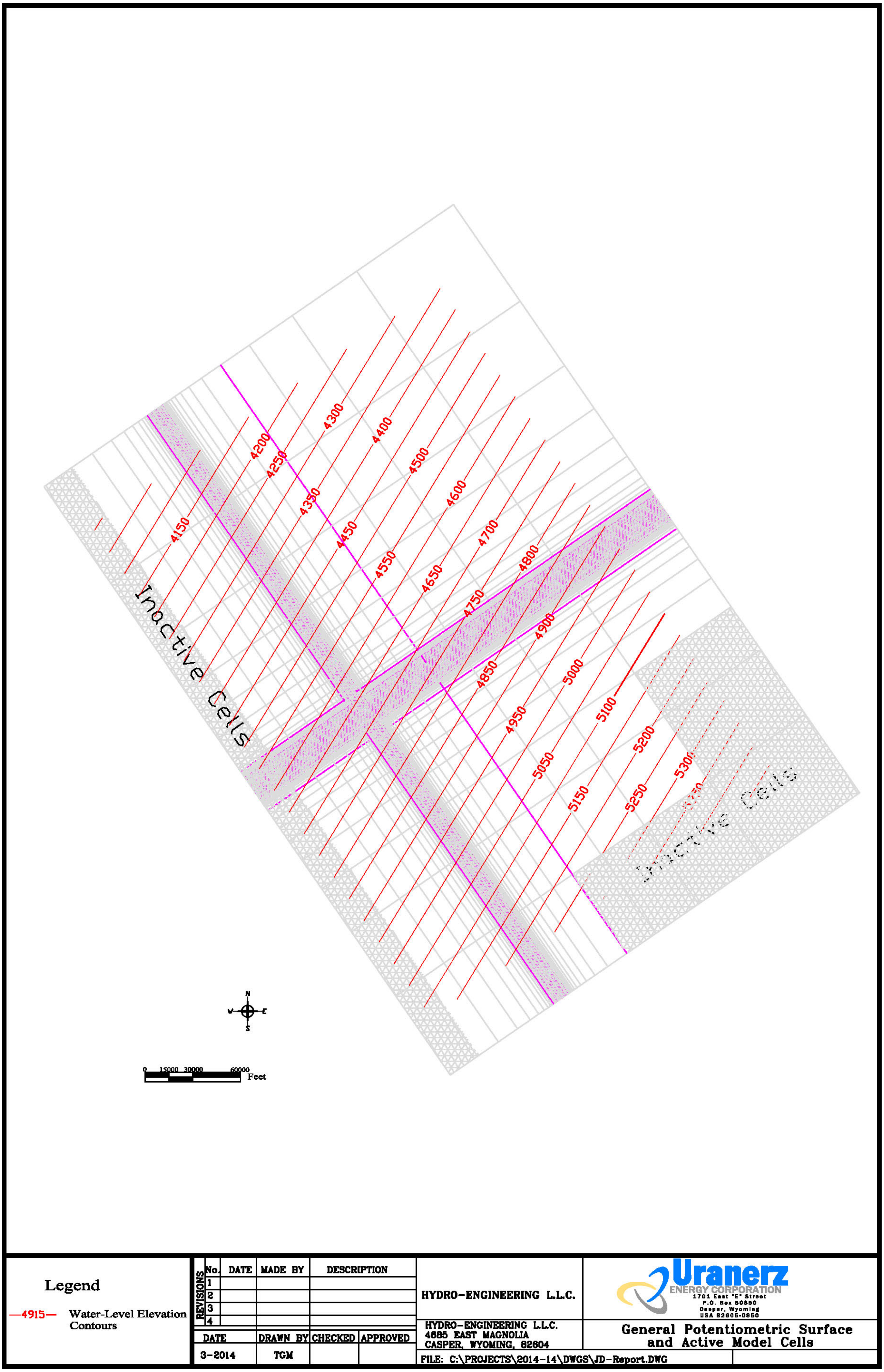

Figure MPI.1-2. General Potentiometric Surface and Active Model Cells.

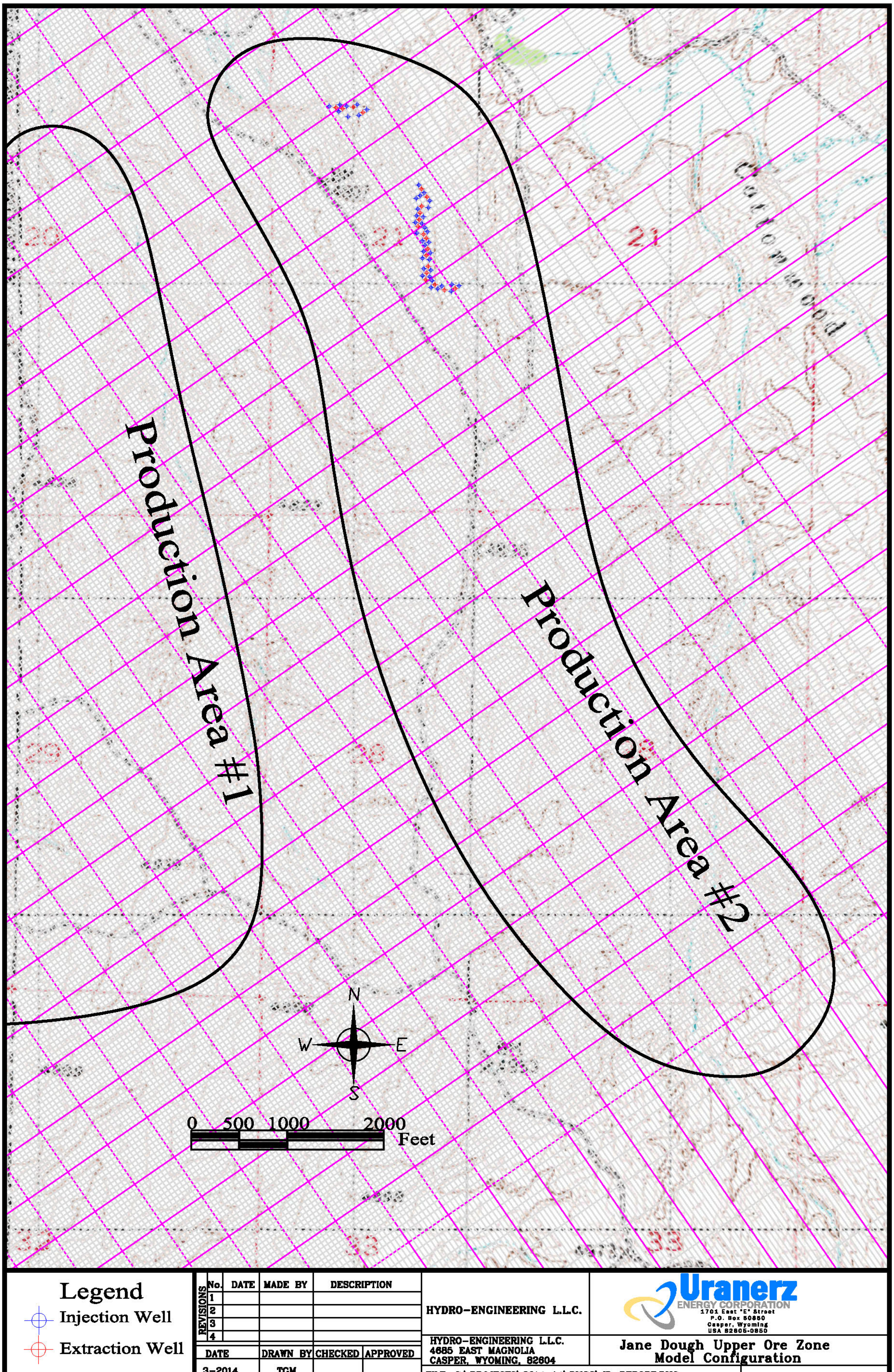

Figure MPI.1-3. Jane Dough Upper Ore Zone Model Configuration.

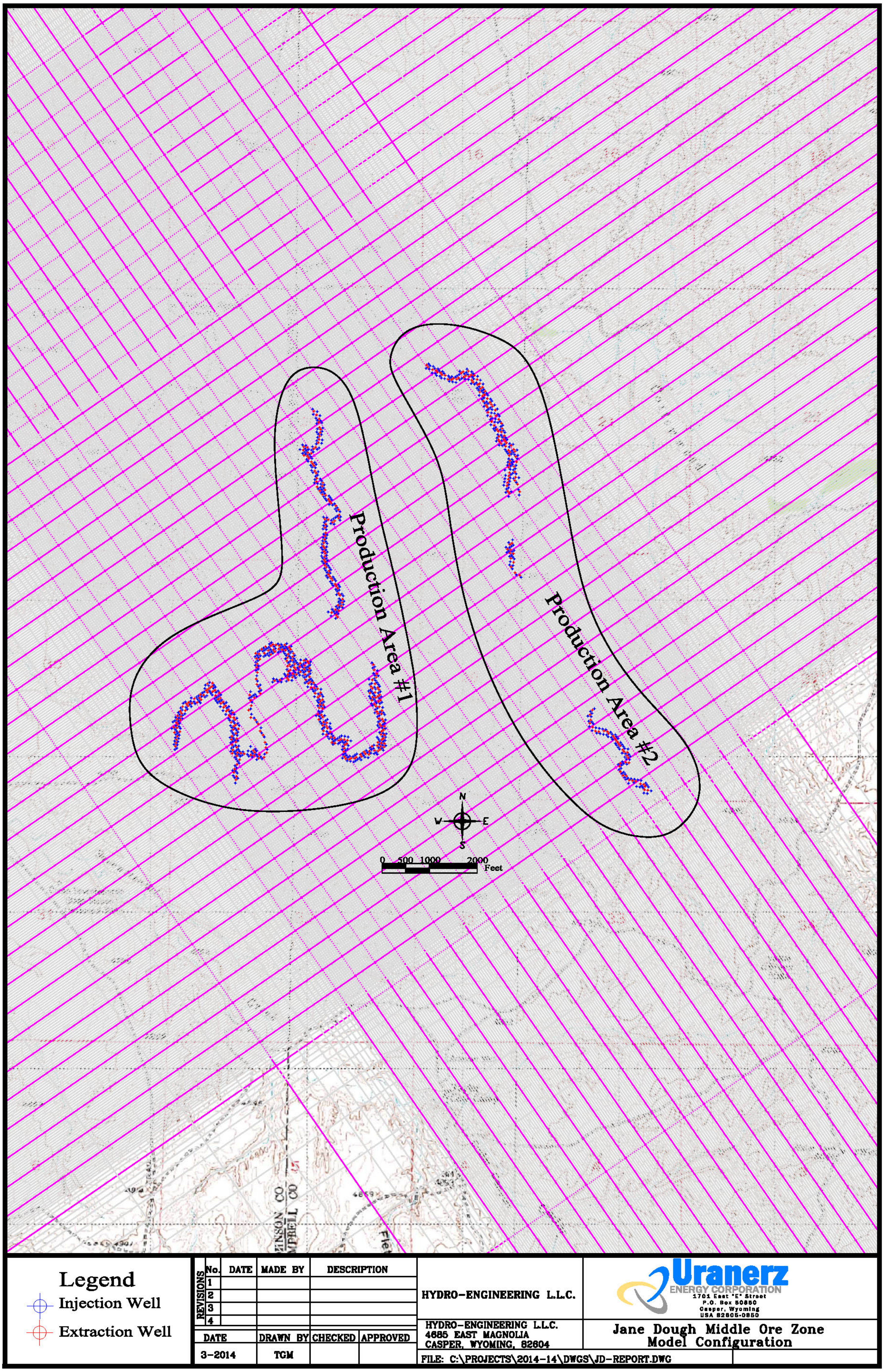

Figure MPI.1-4. Jane Dough Middle Ore Zone Model Configuration.

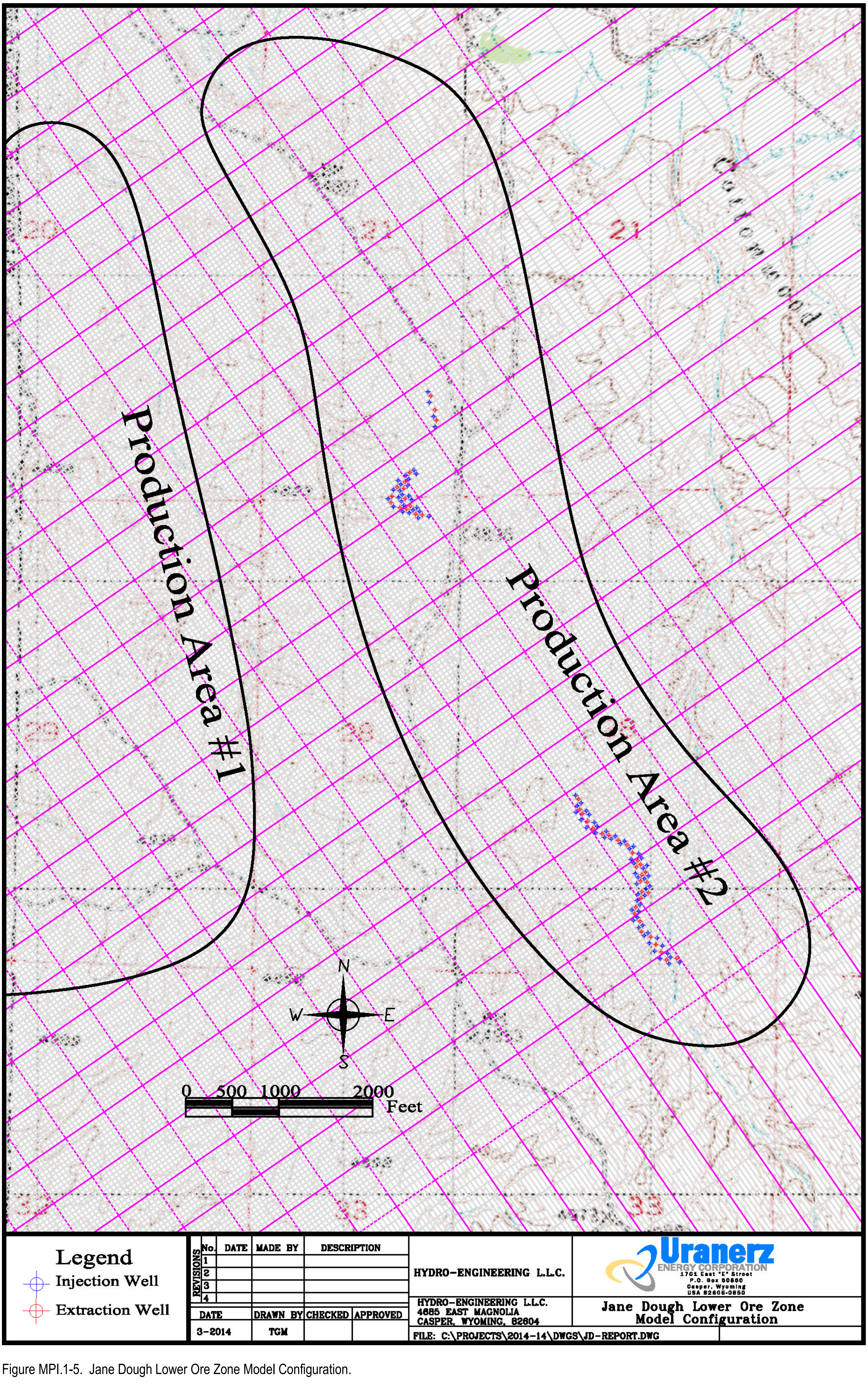

Figure MPI.1-5. Jane Dough Lower Ore Zone Model Configuration.

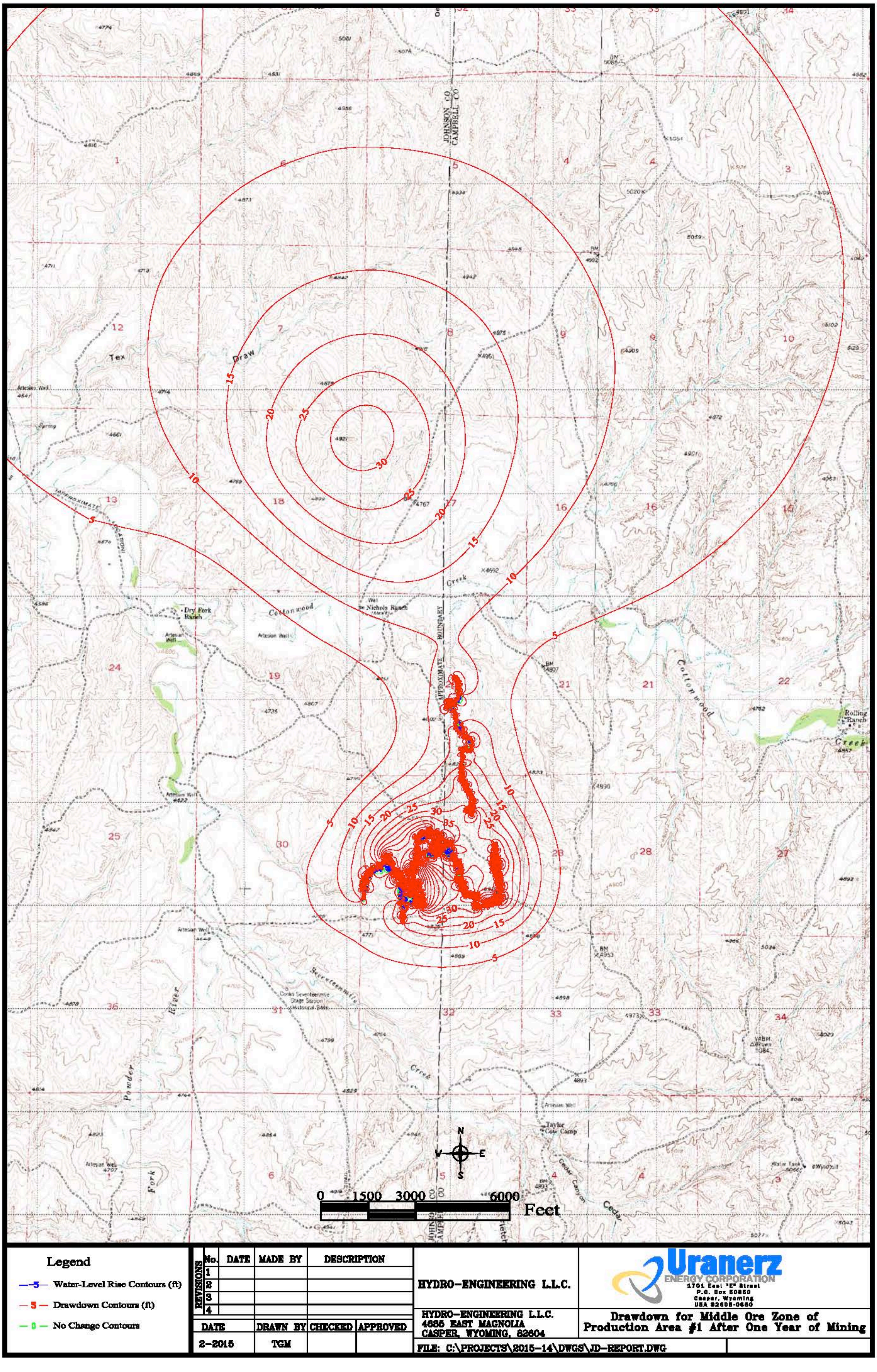

Figure MPI.1-6. Predicted Drawdown for Middle Ore Zone of Production Area #1 After One Year of Mining.

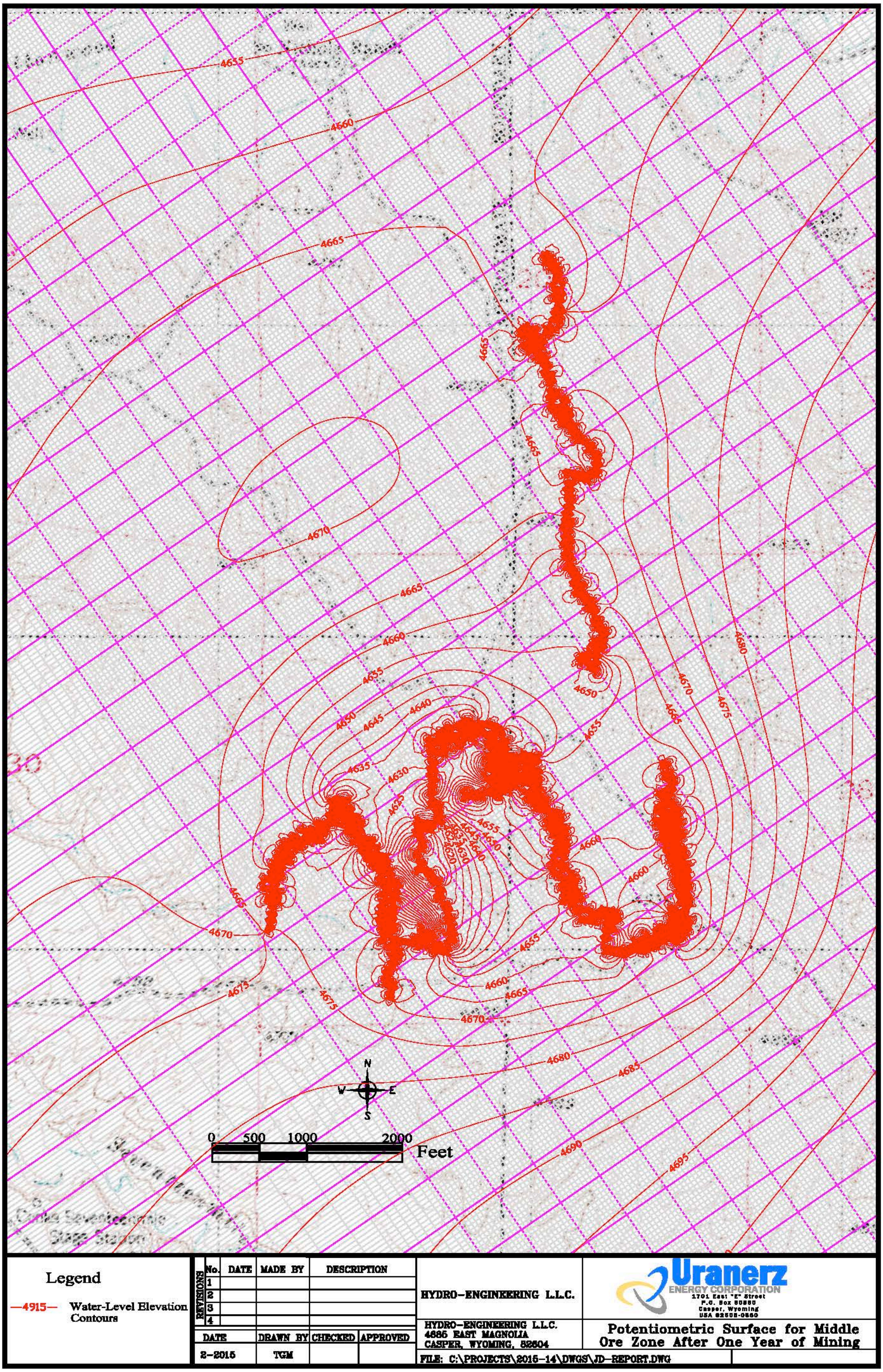

Figure MPI.1-7. Potentiometric Surface for Middle Ore Zone After One Year of Mining.

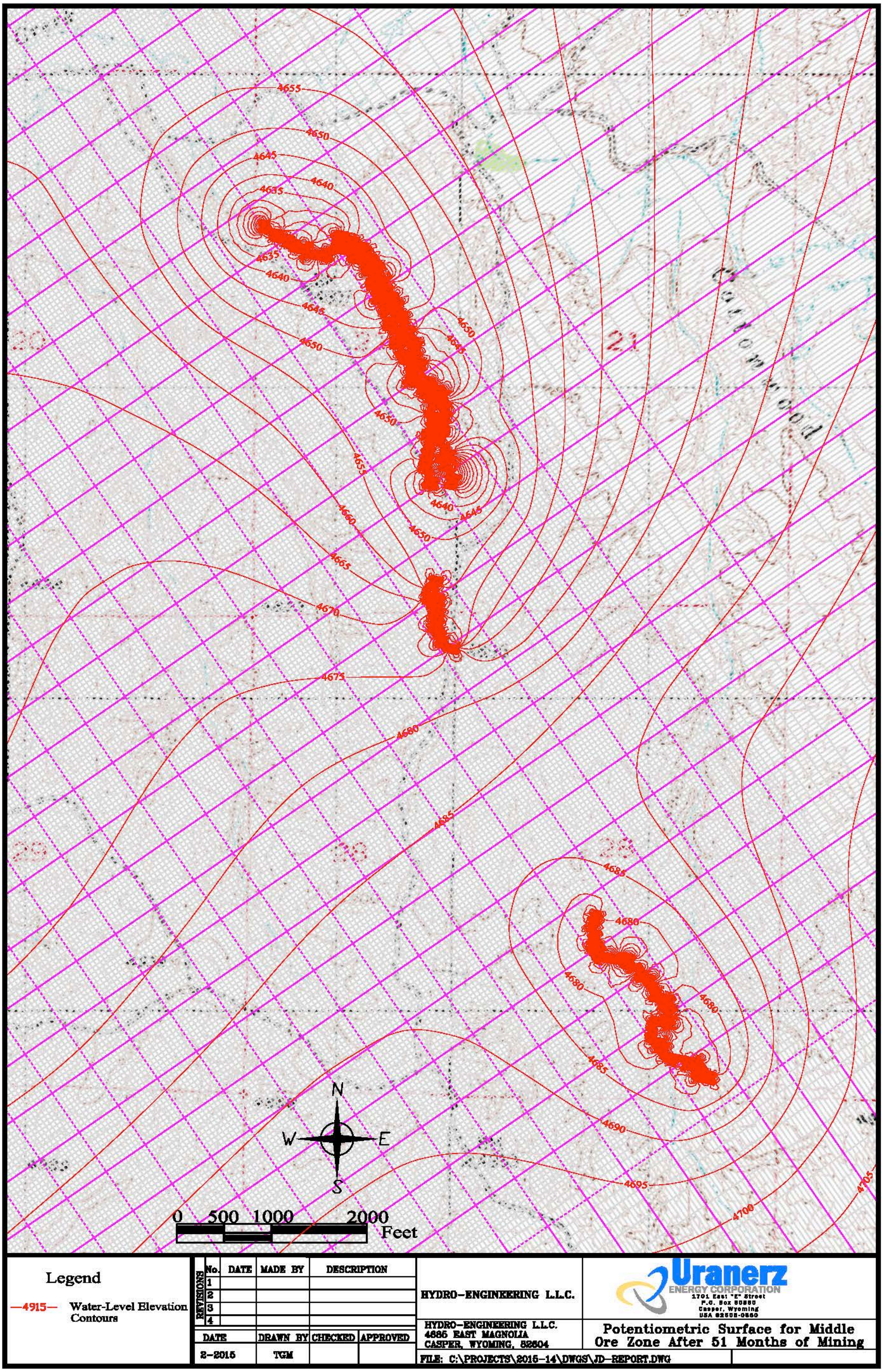

Figure MPI.1-8. Potentiometric Surface for Middle Ore Zone After 51 Months of Mining.

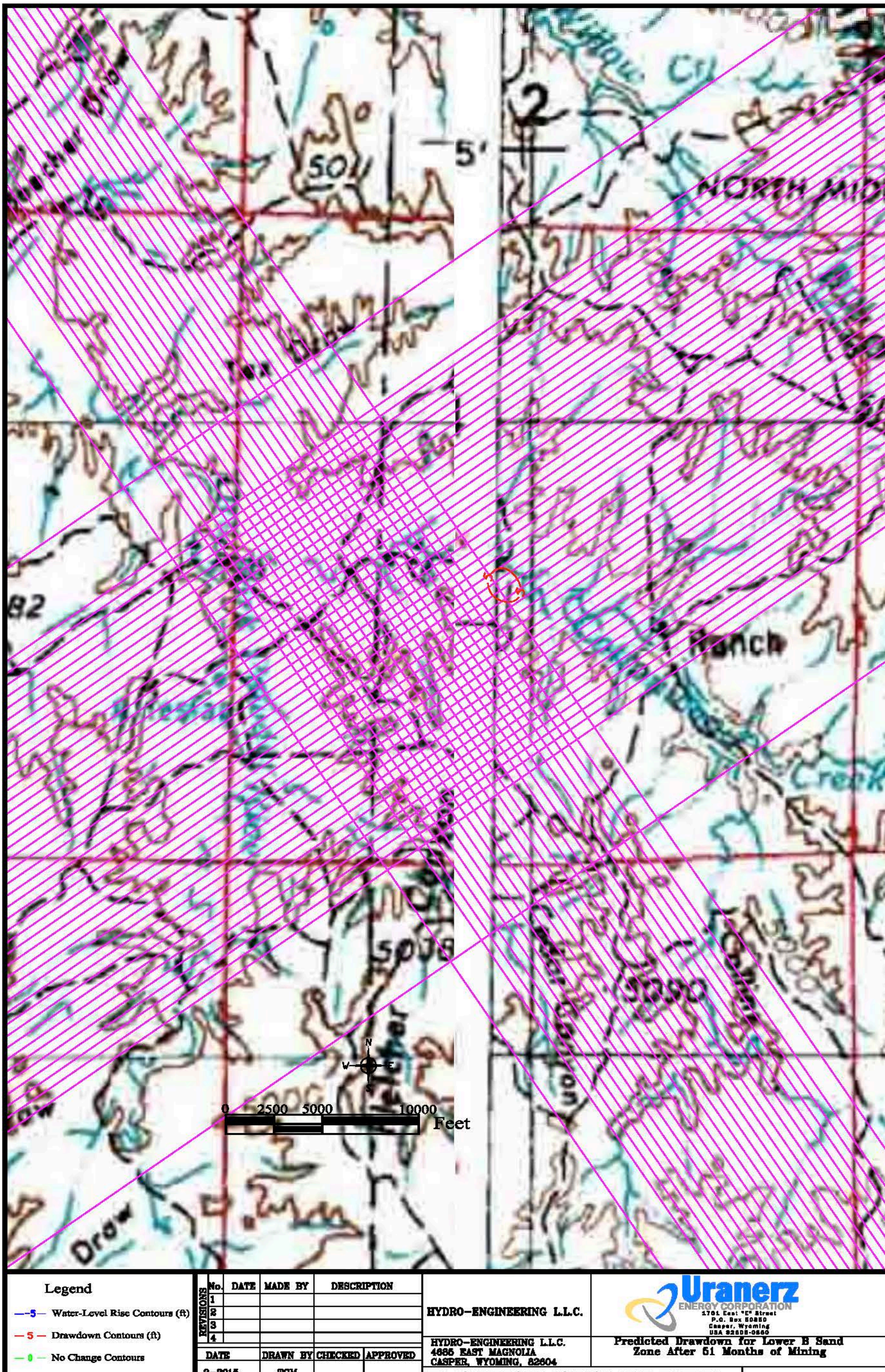

Figure MPI.1-9. Predicted Drawdown for Lower B Sand After 51 Months of Mining.

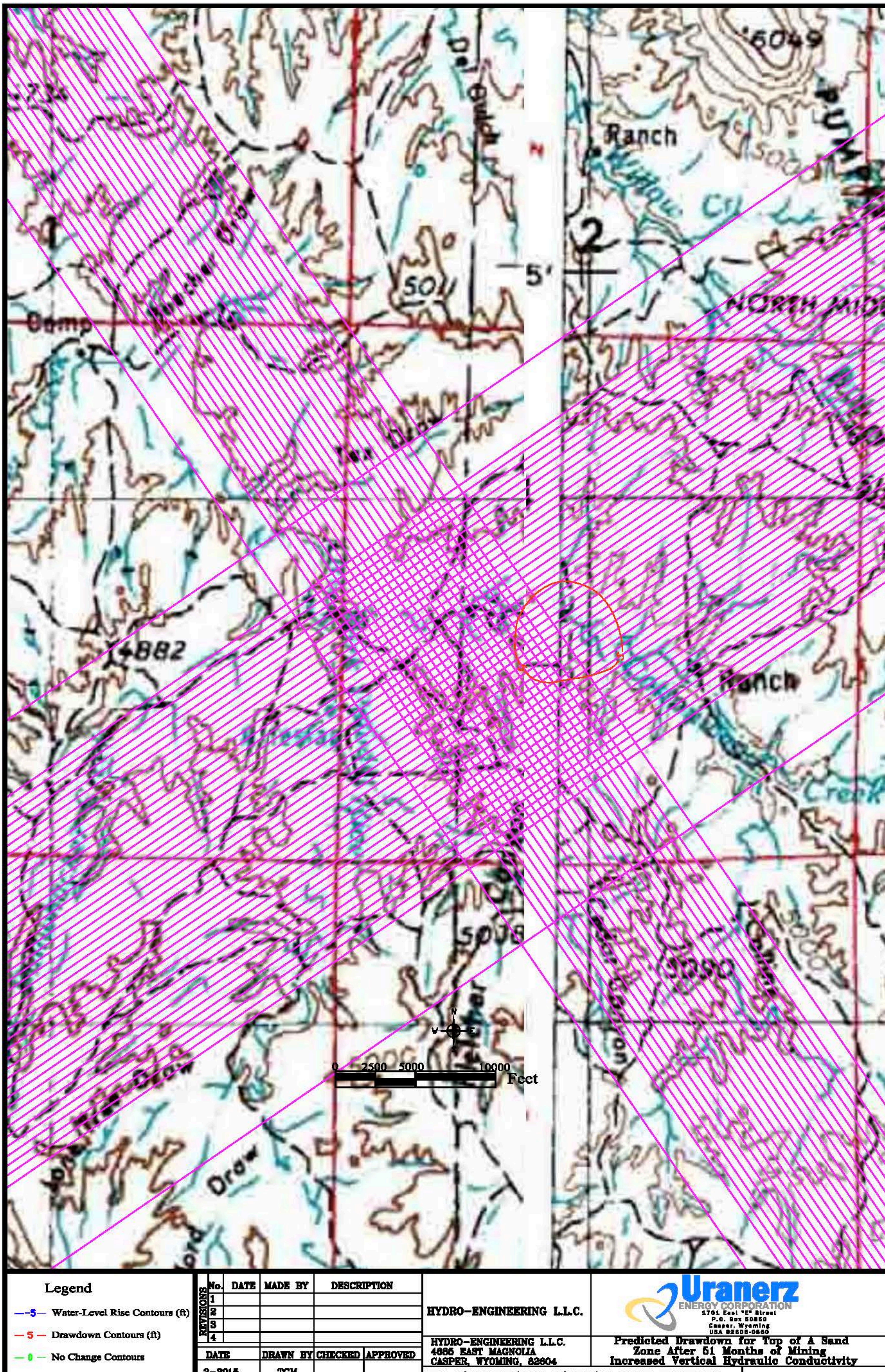

Figure MPI.1-10. Predicted Drawdown for Top of A Sand After 51 Months of Mining.

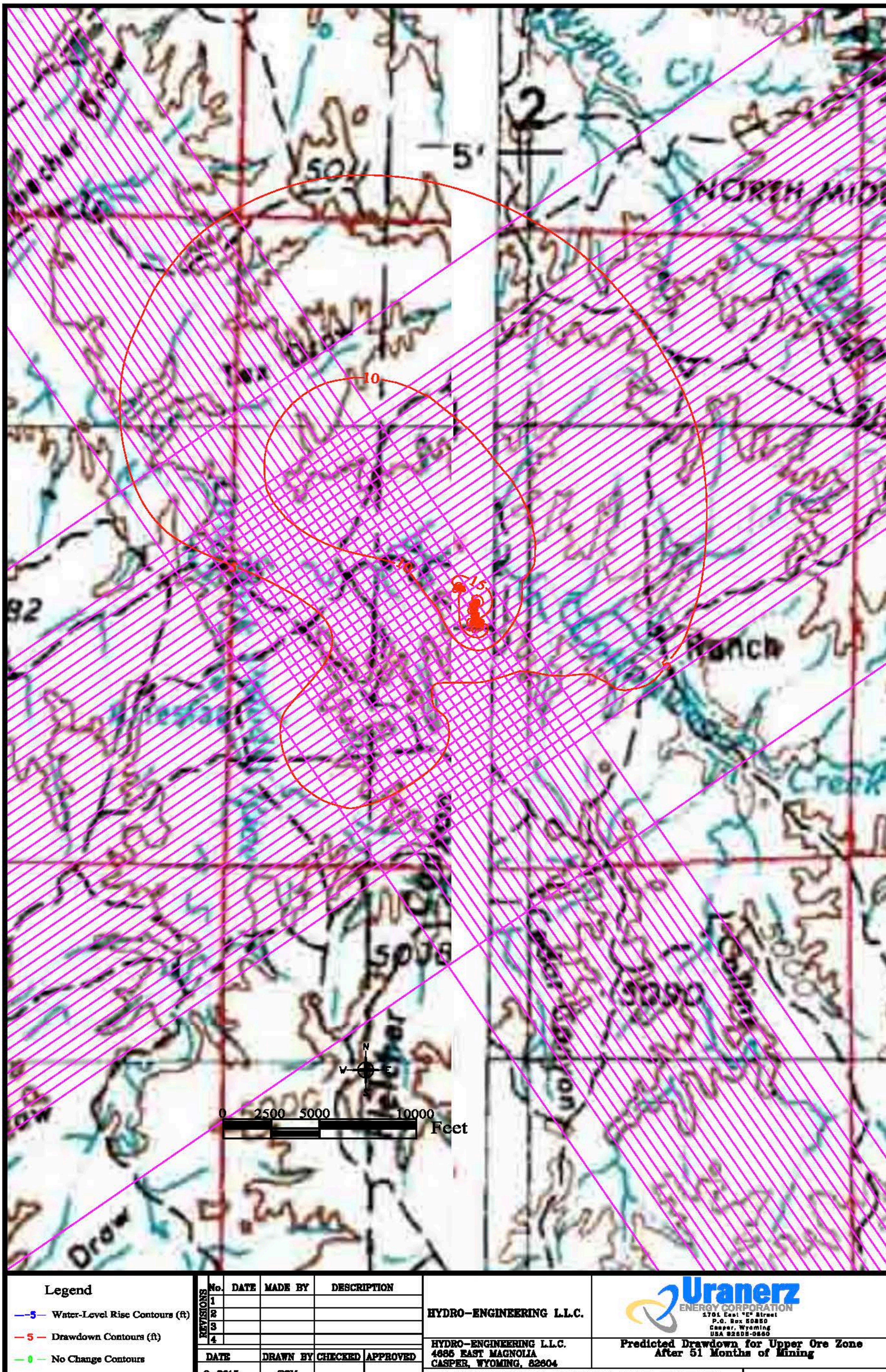

Figure MPI.1-11. Predicted Drawdown for Upper Ore Zone After 51 Months of Mining.

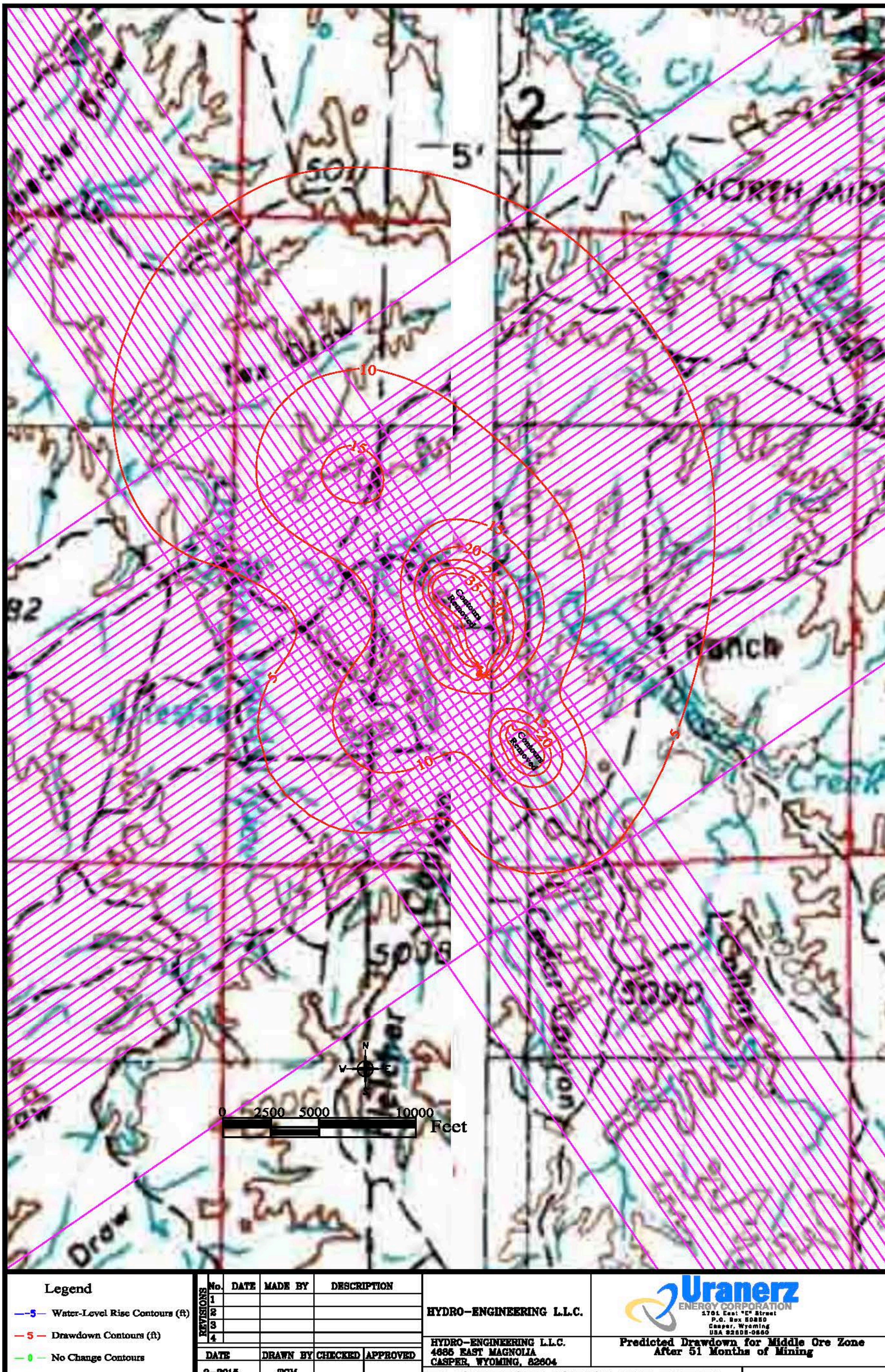

Figure MPI.1-12. Predicted Drawdown for Middle Ore Zone After 51 Months of Mining.

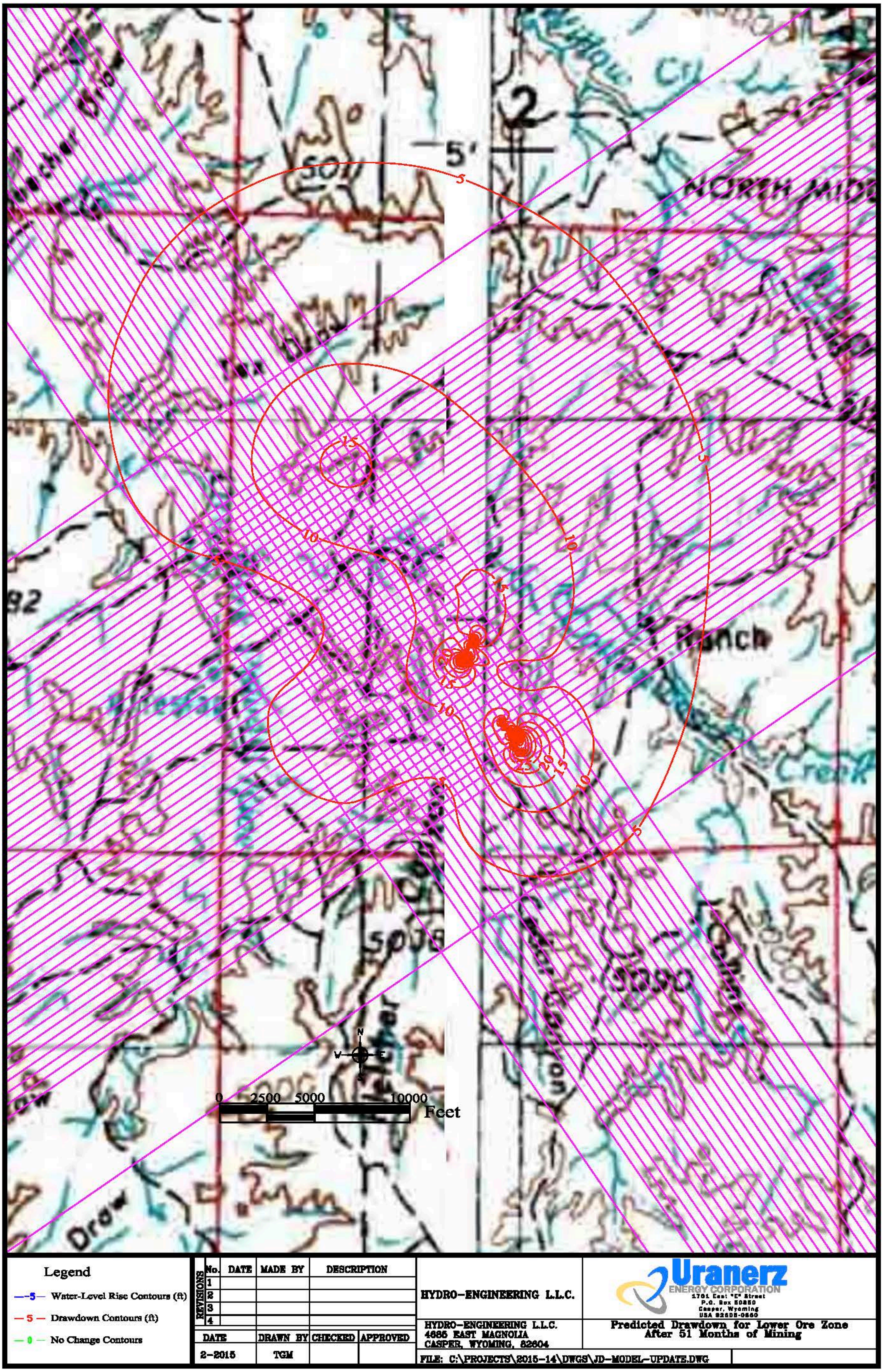

Figure MPI.1-13. Predicted Drawdown for Lower Ore Zone After 51 Months of Mining.

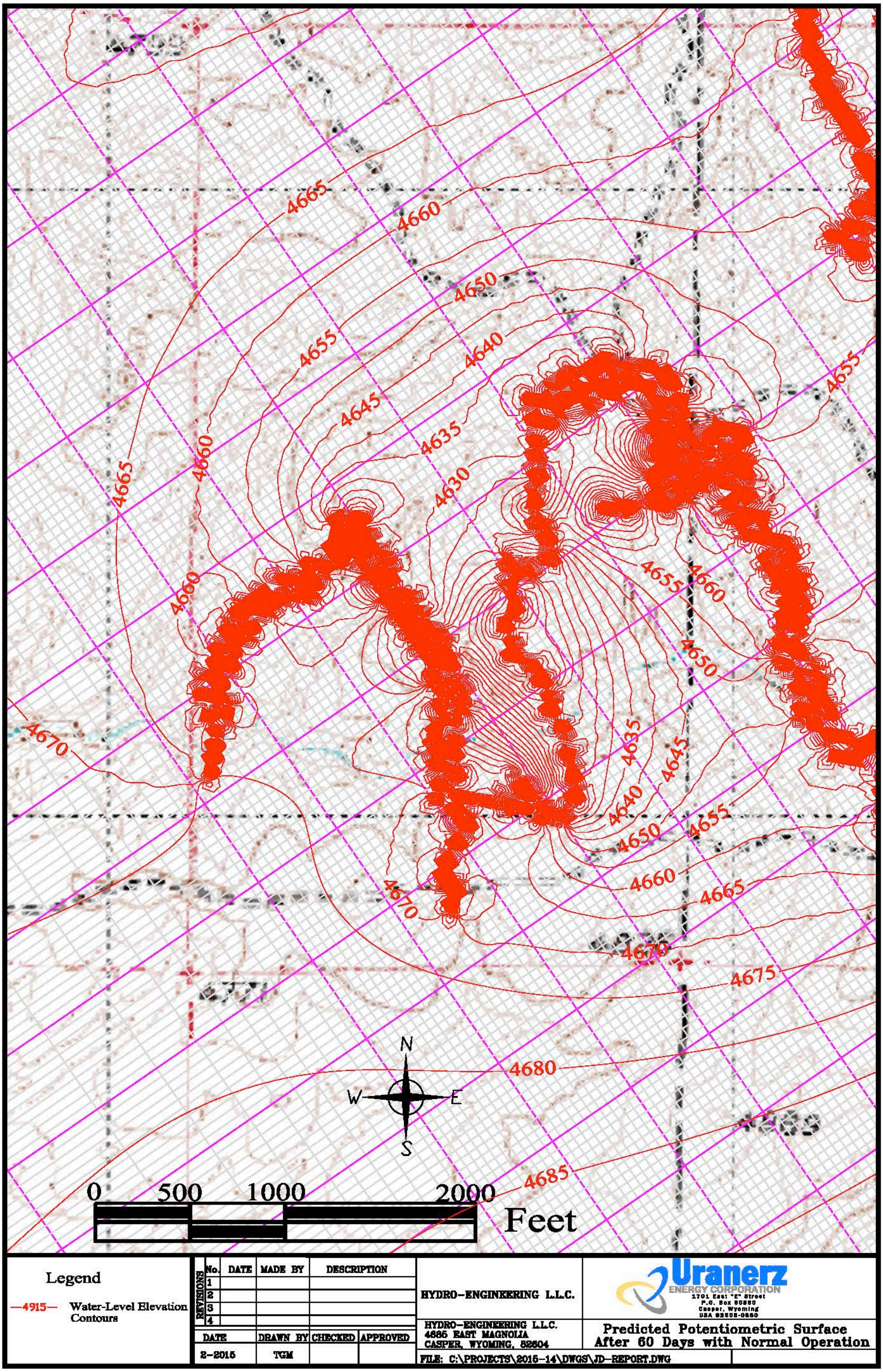

Figure MPI.1-14. Predicted Potentiometric Surface After 60 Days with Normal Operation.

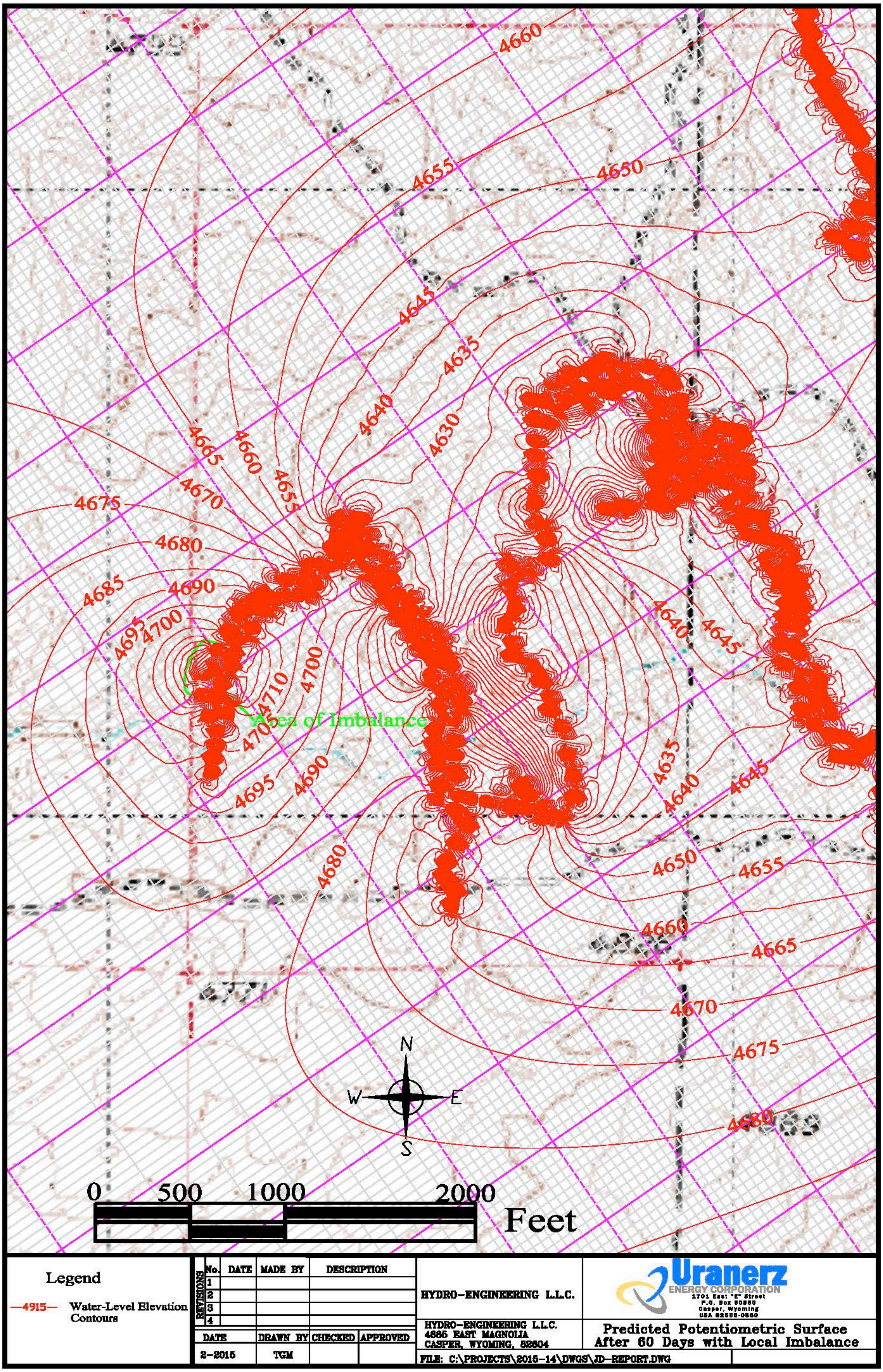

Figure MPI.1-15. Predicted Potentiometric Surface After 60 Days with Local Imbalance.

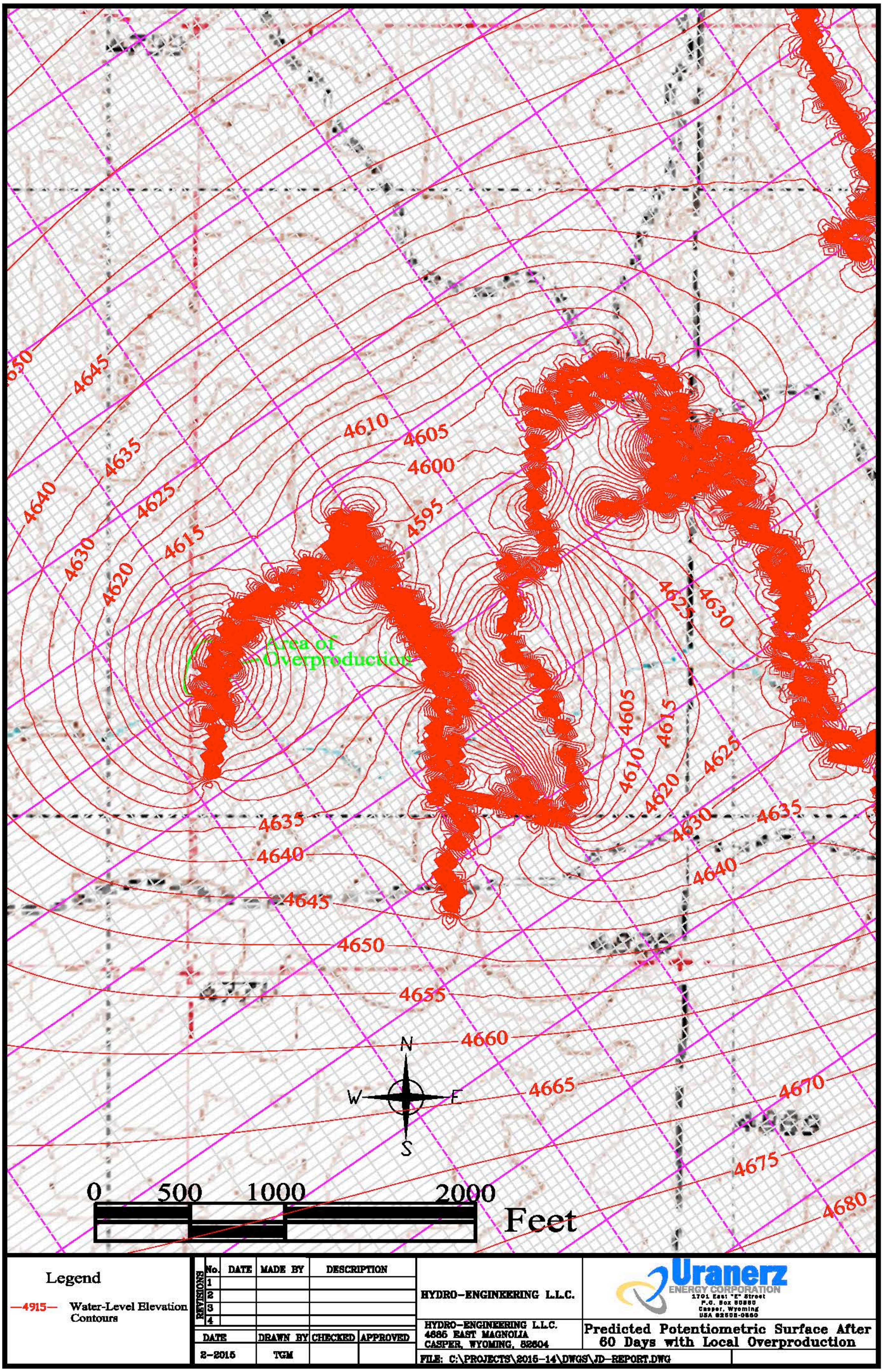

Figure MPI.1-16. Predicted Potentiometric Surface After 60 Days with Local Overproduction.

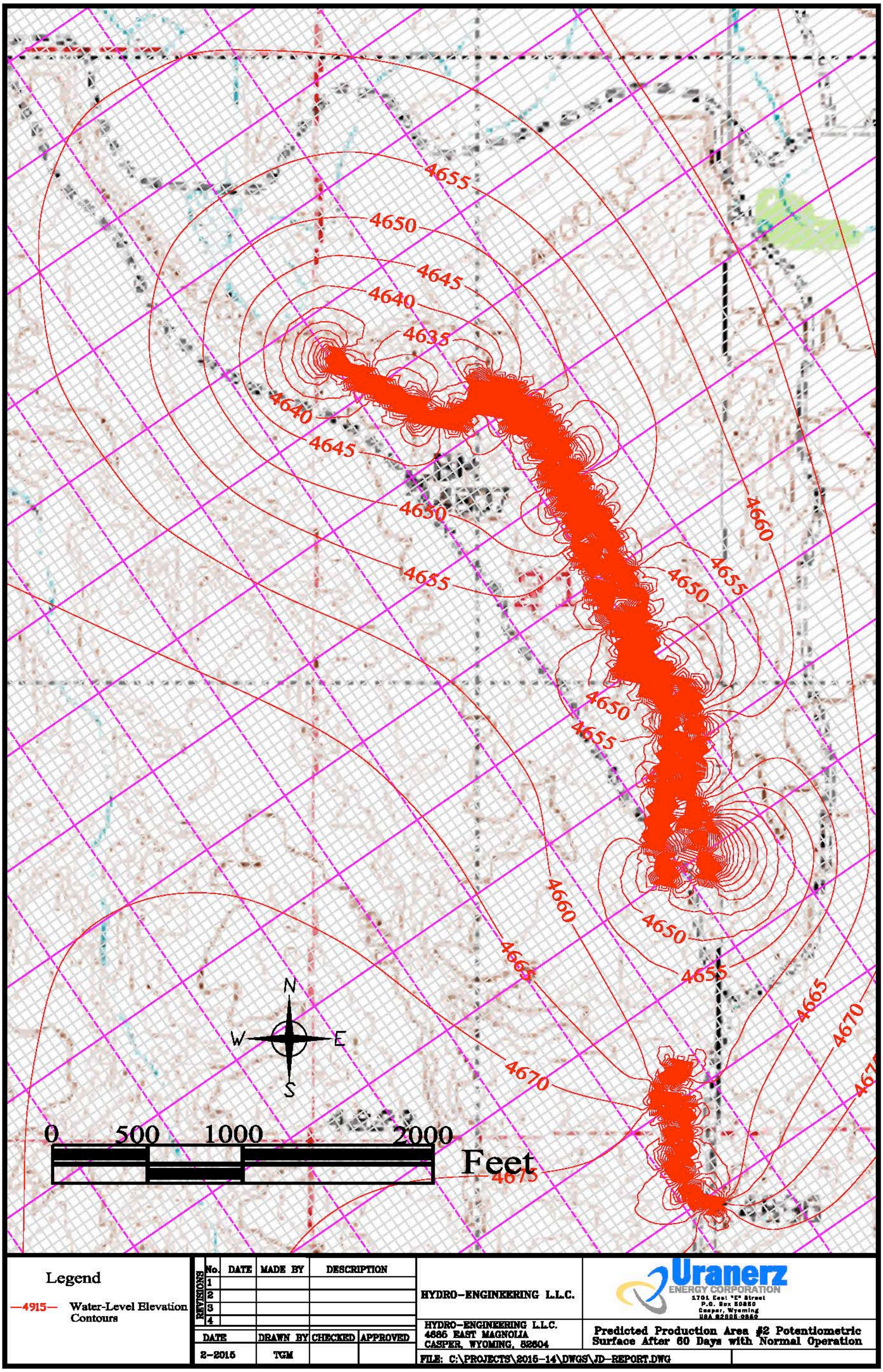

Figure MPI.1-17. Predicted Production Area #2 Potentiometric Surface After 60 Days with Normal Operation.

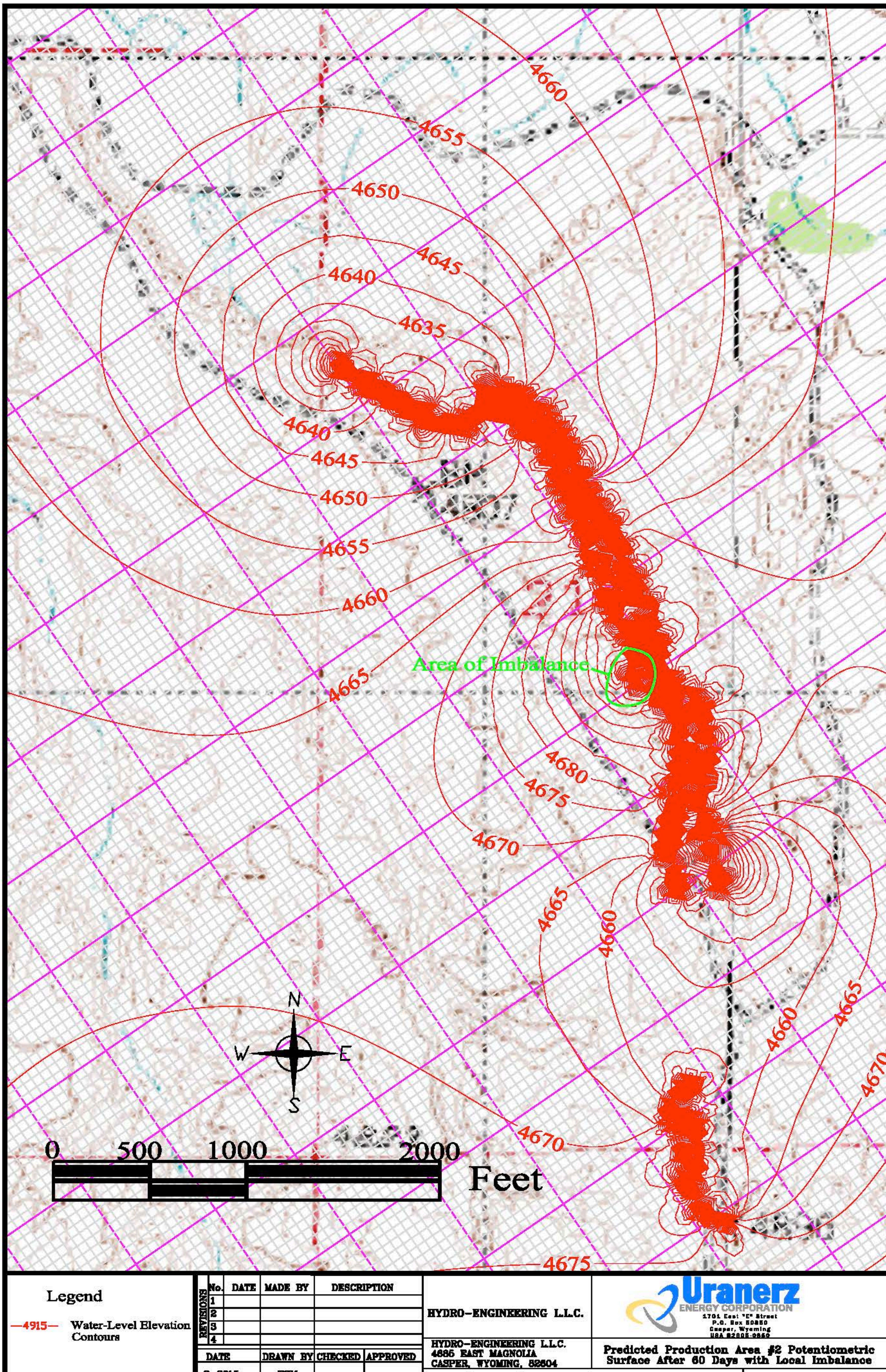

Figure MPI.1-18. Predicted Production Area #2 Potentiometric Surface After 60 Days with Local Imbalance.

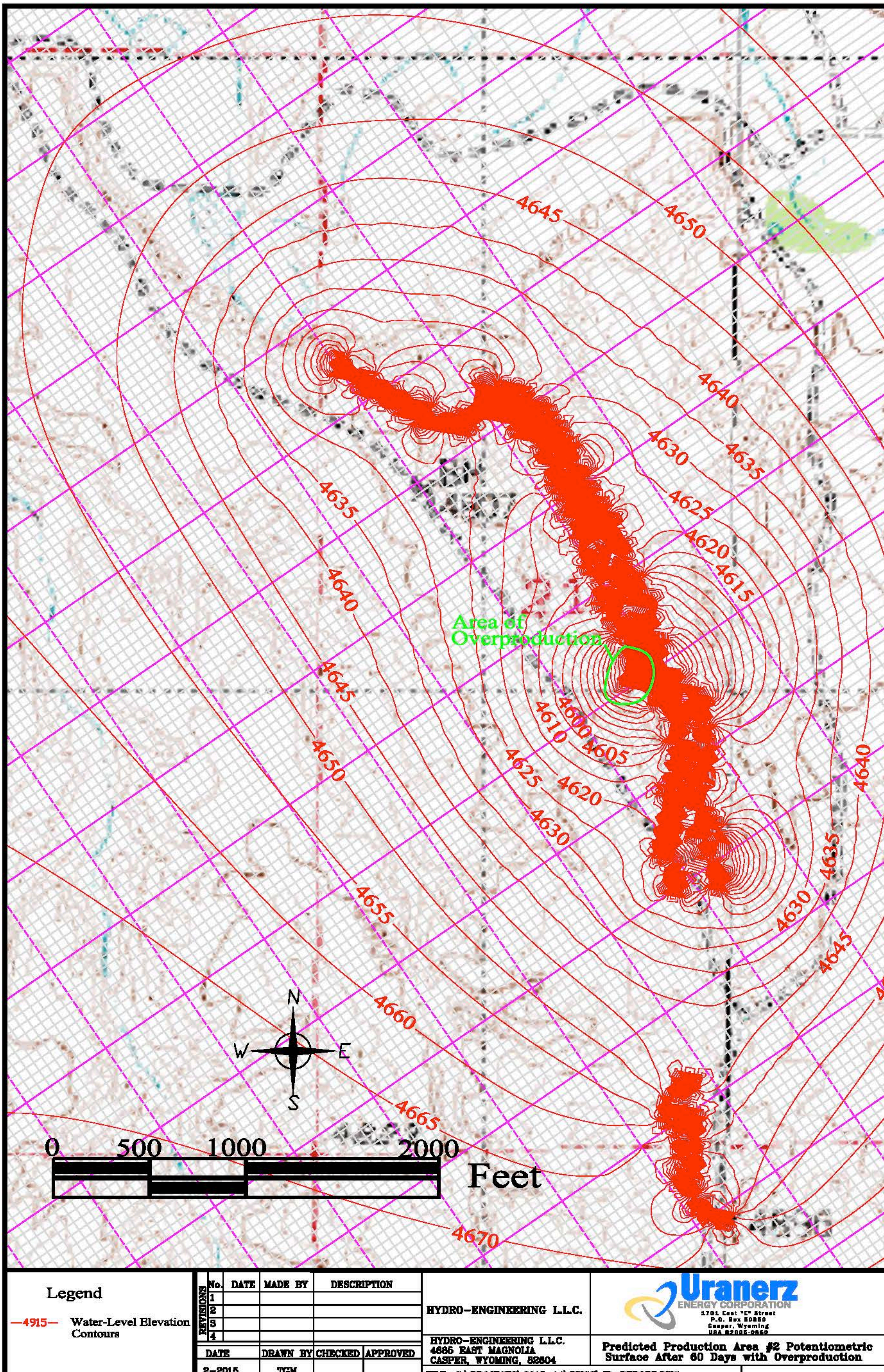

Figure MPI.1-19. Predicted Production Area #2 Potentiometric Surface After 60 Days with Local Overproduction.