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NUCLEAR ENERGY

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February 19, 2009

UN#09-106

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Subject: UniStar Nuclear Energy, NRC Docket No. 52-016
Calvert Cliffs Nuclear Power Plant, Unit 3
Supplemental Response for RAI HS-13

Reference: Letter UN#08-018 G. Vanderheyden (UniStar Nuclear Energy) to Document Control Desk (U.S. Nuclear Regulatory Commission), Submittal of Response to Requests for Additional Information for the Calvert Cliffs Nuclear Power Plant, Unit 3 and Request for Withholding of Documents, dated June 12, 2008

The referenced letter provided UniStar Nuclear Energy's responses to Requests for Additional Information (RAIs) related to the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 Environmental Report (ER). Specifically, the referenced letter stated that a supplemental response for RAI HS-13 providing the results of the site specific groundwater model analysis evaluating offsite impacts in the Surficial aquifer recharge rate would be provided at a later date. The response goes on to state that figures depicting the construction footprint and post-construction topography will also be provided. The response for RAI HS-29 also stated that the results of the site specific groundwater model analysis for the Surficial aquifer would be provided at a later date. The response to RAI HS-13 also satisfies this commitment.

The enclosure provides our response to RAI HS-13, which includes revised COLA content. A Licensing Basis Document Change Request has been initiated to incorporate this change and changes to FSAR 2.4.12.5 into a future revision of the COLA. The regulatory commitment identified in the referenced letter, regarding the supplemental information for RAIs HS-13 and HS-29, are closed.

D079
NRO

If you have any questions, please call Mr. Dimitri Lutchenkov at (410) 470-5524.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on February 19, 2009

Greg Gibson

Enclosure: 1. Supplemental Response for RAI HS-13

cc: Silas Kennedy, U.S. NRC Resident Inspector, Calvert Cliffs Nuclear Power Plant, Units 1 and 2
Thomas Fredrichs, NRC Environmental Project Manager, U.S. EPR Combined License Application
John Rycyna, NRC Safety Project Manager, U.S. EPR Combined License Application
Getachew Tesfaye, NRC Project Manager, U.S. EPR Design Certification Application (w/o enclosures)

Enclosure 1

Supplemental Response for RAI HS-13
CCNPP Unit 3 Environmental Report

RAI HS-13 **ER Section 2.3**

Request:

A permanent groundwater dewatering system is not anticipated to be a design feature for the CCNPP Unit 3 facilities. Removal of a portion of the Surficial aquifer during construction may eventually lower the expected depth to groundwater. Surface water controls to minimize precipitation infiltration and the redirection of surface runoff away from the facility area are expected, further minimizing water infiltration to the groundwater system beneath the site. Groundwater elevations will continue to be monitored, and any observed deviations in groundwater elevations potentially impacting the current design basis will be accounted for to design a construction dewatering system, as appropriate (Section 2.3.2.2.11 page 2.3-47). Provide if possible a topographic map with an overlay of the construction foot print and with contours that can be easily read. Describe how the recharge to the Surficial aquifer would be impacted in the short term. Long term is presented in Figures 2.3.2-(24-25). Identify how the seeps and streams would be impacted and how this would impact local wells.

Initial Response dated June 12, 2008 (UN#08-018):
A figure depicting the construction footprint and post-construction topography will be provided in a future revision of the ER. Also, the existing Surficial aquifer groundwater model will be updated to include an evaluation of offsite impacts due to changes in recharge as well as impacts to local seeps and springs. From a qualitative perspective, since the Surficial aquifer is laterally discontinuous due to local stream dissection, the short term impact to recharge is expected to be minimal. However, the existing Surficial aquifer groundwater model is being updated/revised to include an evaluation of any offsite impacts. The results of this modeling will be reported to the NRC by November 30, 2008.

Supplemental Response

Note - This response supplements the response previously provided to the NRC in UniStar letter UN#08-018, Enclosure 3, Item Number HS-13, dated June 12, 2008.

The numerical model of the Surficial aquifer has been revised to evaluate construction impacts to groundwater levels in the vicinity of the power block and stream flow off site in John's Creek. Figure 2.3-86 shows the topography of the post-construction groundwater flow model and Figure 4.2-1 shows the construction footprint of the CCNPP Unit 3 site. Both stream flow and groundwater levels after construction of CCNPP Unit 3 will be dependent upon several factors, including the hydraulic conductivity of the engineered fill material used and the rate of groundwater recharge within the graded area of the site.

The hydraulic conductivity of the engineered fill must be estimated because it has not yet been placed and, therefore, cannot be measured. The rate of groundwater recharge within the graded area of the site is difficult to predict because construction of structures, paving with impermeable surfaces and installation of stormwater drains all have the effect of reducing recharge while leveling of the topography, placement of relatively permeable engineered fill, removal of vegetation and its associated evapotranspiration and construction of stormwater retention ditches and basins all have the effect of increasing recharge. All of these activities will be undertaken during construction of CCNPP Unit 3.

A sensitivity analysis to improve estimates of the hydraulic conductivity of the engineered fill and groundwater recharge within the graded area of the site was completed using the numerical model. This analysis determined baseline values of 0.005 cm/sec and 5 in/yr, respectively, for these parameters.

Baseline values of hydraulic conductivity and groundwater recharge for the native soils were determined to be 0.001 cm/sec and 5 in/yr, respectively. Model simulations using these values produce groundwater levels that best satisfy the model calibration criteria. Assuming the baseline conditions, where the rate of groundwater recharge in areas to be graded does not differ significantly from that in undisturbed wooded areas of the site (i.e. 5 in/yr), model simulations show that the estimated average groundwater discharge into John's Creek after construction of CCNPP Unit 3 will be approximately 20 percent lower than before construction.

The magnitude of this change is primarily dependent upon the rate of groundwater recharge that will occur over the graded area of the site. Assuming baseline conditions, cutting, filling and grading of the site cause the position of the existing groundwater divide to shift to the east and a greater proportion of groundwater recharge from the site to flow toward the Chesapeake Bay rather than John's Creek. However, if the rate of groundwater recharge over the graded area is actually twice as high as in the undisturbed wooded areas, the discharge to John's Creek after construction of Unit 3 will increase by up to about 20 percent.

On the other hand, the results of modeling show that if the rate of recharge over the graded area is equal to only half the rate over the undisturbed wooded areas, the discharge to John's Creek will be reduced by about 50 percent. Several stormwater retention ditches and basins will be used to promote infiltration of site drainage, and evapotranspiration will be substantially reduced by clearing approximately 274 acres of woodland. Both of these actions will have the effect of increasing net groundwater recharge to the site. In addition, only the relatively small areas of the CCNPP Unit 3 site occupied by the access road and the nuclear island will be paved. Maintaining a low percentage of paved surface area will minimize the extent to which groundwater recharge is reduced. For these reasons, it is likely that the rate of groundwater recharge within the graded area of the site will be greater than the rate within the undisturbed wooded areas. Therefore, groundwater discharge to John's Creek most likely will not decrease substantially and may slightly increase after construction of CCNPP Unit 3.

Cutting, filling and grading will locally affect the location and flow of springs and seeps on the CCNPP Unit 3 site. These springs and seeps occur where the base of the Surficial aquifer is exposed within erosion channels and at the face of embankments. Downward flow of groundwater within the aquifer is restricted by the underlying aquitard and discharge occurs laterally at these locations, forming a spring or seep. Springs and seeps that currently exist in areas to be filled by site grading will be buried. However, they will be buried with fill whose hydraulic conductivity will likely be greater than that of the Surficial aquifer from which the springs and seeps currently flow. New springs and seeps will likely issue from the toe of the fill, in locations further down-gradient from their former positions.

The effect on local users of groundwater from cutting, filling and grading the CCNPP Unit 3 site will be negligible. The upland deposits of southern Calvert County are deeply incised by stream erosion, such that they are laterally discontinuous. This condition causes dissection of the Surficial aquifer into relatively small areas that are effectively isolated and have limited hydraulic connection. Furthermore, because of its thin and variable saturated thickness (typically less than 20 feet at CCNPP) and vulnerability to low yield during droughts, few water wells are completed in the Surficial aquifer in southern Calvert County. As discussed in the supplemental response RAI HS-4, deeper aquifers beneath the Surficial aquifer are effectively segregated from flow in the shallow aquifer. For these reasons, users of groundwater near CCNPP are expected to experience no significant impacts to their water supplies due to construction or operation of CCNPP Unit 3.

ER Impact:

The following text changes highlighted in green and underlined will be provided in a future COLA revision.

2.3.2.2.11 Site Characteristics for Subsurface Hydrostatic Loading and Dewatering

The completed surface grade for CCNPP Unit 3 is expected to range between elevations of 72 and 85 ft (21.9 and 25.9 m) msl, requiring cut and fill across the CCNPP site area. The proposed grade elevation of the nuclear island is approximately 85.0 ft (25.9 m) msl. The minimum design depth for construction activities is currently estimated to be at an approximate elevation of 44 ft (13.4 m) msl for the reactor containment structure. Groundwater elevations within the Surficial aquifer range from approximately 68 to 85 ft (20.7 m to 25.9 m) msl with the highest observed elevations occurring in the CCNPP Unit 3 power block area. Since the current maximum observed Surficial aquifer groundwater elevation is at proposed grade level in the nuclear island area, the water table lies approximately 41 ft (12.5 m) above the lowest subsurface portions of safety-related structures, systems, and components.

The U.S. EPR Final Safety Analysis Report (FSAR) requires that maximum groundwater elevation be at least 3.3 ft (1.0 m) below grade for the nuclear island. As indicated above, existing data indicates that the groundwater is currently at the proposed grade level in the nuclear island area, potentially outside of the U.S. EPR FSAR design envelope. Since the CCNPP Unit 3 cut and fill operations, site grading, and construction activities will alter the existing Surficial aquifer groundwater system, groundwater modeling was employed to evaluate these effects and determine post-construction groundwater levels below the nuclear island. Modeling results indicate the following:

- With the exception of the Essential Service Water System Cooling Tower 1 and Emergency Power Generating Building 1/2, Surficial aquifer water table elevations range approximately 4.0 to 10.0 ft (1.2 to 3.0 m) below proposed grade at all safety-related facilities (Figure 2.3-79).
- The water table averages approximately 4.0 ft (1.2 m) below grade at Service Water System Cooling Tower 1 and approximately 3.0 ft (0.9 m) below grade at Emergency Power Generating Building 1/2 (Figure 2.3-80).
- Groundwater mounding in the Surficial aquifer will no longer be present below the CCNPP Unit 3 power block area (which includes the nuclear island). Horizontal flow will be predominantly to the north and east and controlled by discharge to the bio-retention ditches on the northwest, northeast, and southeast sides of the CCNPP Unit 3 power block area (Figure 2.3-80).

Modeled post-construction water table elevations will average approximately 73.0 ft (22.3 m) msl at the nuclear island (Figure 2.3-80). Therefore a maximum of approximately 29.0 ft (8.8 m) of groundwater induced hydrostatic head loadings should be used as the design basis for the subsurface portions of all safety-related structures.

The numerical model of the Surficial aquifer has been revised to evaluate construction impacts to groundwater levels in the vicinity of the power block and stream flow off site in John's Creek. Figure 2.3-86 shows the topography of the post-construction groundwater flow model and Figure 4.2-1 shows the construction footprint of the CCNPP Unit 3 site. Both stream flow and groundwater levels after construction of CCNPP Unit 3 will be dependent upon several factors, including the hydraulic conductivity of the engineered fill material used and the rate of groundwater recharge within the graded area of the site.

The hydraulic conductivity of the engineered fill must be estimated because it has not yet been placed and, therefore, cannot be measured. The rate of groundwater recharge within the graded area of the site is difficult to predict because construction of structures, paving with impermeable surfaces and installation of stormwater drains all have the effect of reducing recharge while leveling of the topography, placement of relatively permeable engineered fill, removal of vegetation and its associated evapotranspiration and construction of stormwater retention ditches and basins all have the effect of increasing recharge. All of these activities will be undertaken during construction of CCNPP Unit 3.

A sensitivity analysis to improve estimates of the hydraulic conductivity of the engineered fill and groundwater recharge within the graded area of the site was completed using the numerical model. This analysis determined baseline values of 0.005 cm/sec and 5 in/yr, respectively, for these parameters.

Baseline values of hydraulic conductivity and groundwater recharge for the native soils were determined to be 0.001 cm/sec and 5 in/yr, respectively. Model simulations using these values produce groundwater levels that best satisfy the model calibration criteria. Assuming baseline conditions, where the rate of groundwater recharge in areas to be graded does not differ significantly from that in undisturbed wooded areas of the site (i.e. 5 in/yr), model simulations show that the estimated average groundwater discharge into John's Creek after construction of CCNPP Unit 3 will be approximately 20 percent lower than before construction.

The magnitude of this change is primarily dependent upon the rate of groundwater recharge that will occur over the graded area of the site. Assuming baseline conditions, cutting, filling and grading of the site cause the position of the existing groundwater divide to shift to the east and a greater proportion of groundwater recharge from the site to flow toward the Chesapeake Bay rather than John's Creek. However, if the rate of groundwater recharge over the graded area is actually twice as high as in the undisturbed wooded areas, the discharge to John's Creek after construction of CCNPP Unit 3 will increase by up to about 20 percent.

On the other hand, the results of modeling show that if the rate of recharge over the graded area is equal to only half the rate over the undisturbed wooded areas, the discharge to John's Creek will be reduced by about 50 percent. Several stormwater retention ditches and basins will be used to promote infiltration of site drainage, and evapotranspiration will be substantially reduced by clearing approximately 274 acres of woodland. Both of these actions will have the effect of increasing net groundwater recharge to the site. In addition, only the relatively small areas of the CCNPP Unit 3 site occupied by the access road and the nuclear island will be paved. Maintaining a low percentage of paved surface area will minimize the extent to which groundwater recharge is reduced. For these reasons, it is likely that the rate of groundwater recharge within the graded area of the site will be greater than the rate within the undisturbed wooded areas. Therefore, groundwater discharge to John's Creek most likely will not decrease substantially and may slightly increase after construction of CCNPP Unit 3.

Cutting, filling and grading will locally affect the location and flow of springs and seeps on the CCNPP Unit 3 site. These springs and seeps occur where the base of the Surficial aquifer is exposed within erosion channels and at the face of embankments. Downward flow of groundwater within the aquifer is restricted by the underlying aquitard and discharge occurs laterally at these locations, forming a spring or seep. Springs and seeps that currently exist in areas to be filled by site grading will be buried. However, they will be buried with fill whose hydraulic conductivity will likely be greater than that of the Surficial aquifer from which the springs and seeps currently flow. New springs and seeps will likely issue from the toe of the fill, in locations further down-gradient from their former positions.

The effect on local users of groundwater from cutting, filling and grading the CCNPP Unit 3 site will be negligible. The upland deposits of southern Calvert County are deeply incised by stream erosion, such that they are laterally discontinuous. This condition causes dissection of the Surficial aquifer into relatively small areas that are effectively isolated and have limited hydraulic connection. Furthermore, because of its thin and variable saturated thickness (typically less than 20 feet at CCNPP) and vulnerability to low yield during droughts, few water wells are completed in the Surficial aquifer in southern Calvert County. Deeper aquifers beneath the Surficial aquifer are effectively segregated from flow in the shallow aquifer. For these reasons, users of groundwater near CCNPP are expected to experience no significant impacts to their water supplies due to construction or operation of CCNPP Unit 3.

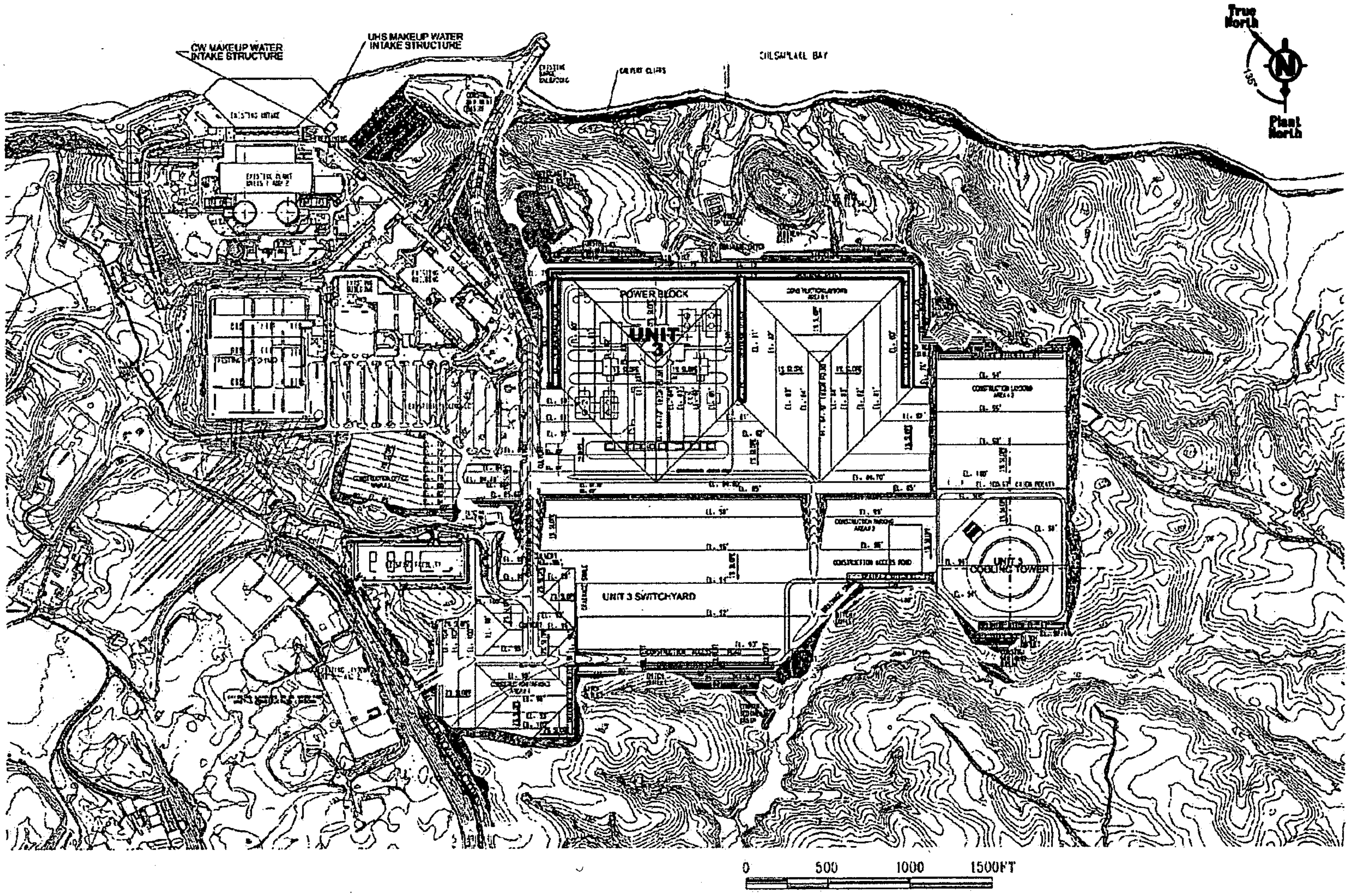
Groundwater within the Surficial aquifer beneath the CCNPP Unit 3 facility area ranges from approximately elevation 68 to 85 ft (20.7 to 25.9 m) msl. Therefore, it is expected that the saturated sands within the Surficial aquifer will be encountered during grading and excavation activities. The saturated sands, where present, rest on at least 10 ft (3m) of relatively low permeable clays and silts at an approximate elevation of 65 to 75 ft (19.8 to 22.9 m) msl. A temporary groundwater management system may need to be employed during excavation to drain and control groundwater flow through the Surficial aquifer. It is expected that surface swales and passive ground drains may be required in areas of higher elevations adjacent to the CCNPP Unit 3 facilities to redirected surface runoff and groundwater away from the site. Stormwater and Surficial aquifer groundwater runoff will be directed to Stormwater Management Basin(s) for settlement prior to discharge to the Chesapeake Bay. If required, this water may also be redirected for construction dust control use or other non-potable water supplies.

From the period of July 2006 through March 2007, groundwater elevations in the Upper Chesapeake unit at the proposed power block area ranged from a high of approximately 41.7 ft (12.7 m) msl in observation well OW-401 to a low of approximately 17.6 ft (5.4 m) msl at well OW-703A. The deepest base of the excavation for construction of the reactor building is an elevation of approximately 44 ft (13.4 m) msl within the clays and silts separating the overlying Surficial aquifer from the Chesapeake sand units. Therefore, it is anticipated that a groundwater management/dewatering system may not be required for the Upper Chesapeake unit. Groundwater elevations will continue to be monitored, and any observed deviations in groundwater elevations potentially impacting the current design bases will be accounted for to design a construction dewatering system, as appropriate.

As previously stated, a permanent groundwater dewatering system is not anticipated to be a design feature for the CCNPP Unit 3 facilities. Based on current groundwater conditions and the anticipated facility surface grade between elevations of 72 to 85 ft (21.9 to 25.9 m), groundwater is expected to be encountered at depths of a few feet to 15 ft (4.6 m) below grade. Removal of a portion of the Surficial aquifer during construction may eventually lower the expected depth to groundwater. ~~Surface water controls to minimize precipitation infiltration and the redirection of surface runoff away from the facility area are expected, further minimizing water infiltration to the groundwater system beneath the site.~~

Electrical manholes within the facility area are expected to be at depths of 10 to 15 ft (3 to 4.6 m) below grade and, therefore, have the potential for encountering groundwater that may eventually leak into these structures. Manhole sump pumps may be required and periodically operated to collect and remove the water seeping into these features.

Figure 4.2-1—{Final Site Grading Plan CCNPP Unit 3}



ER Section 4.0

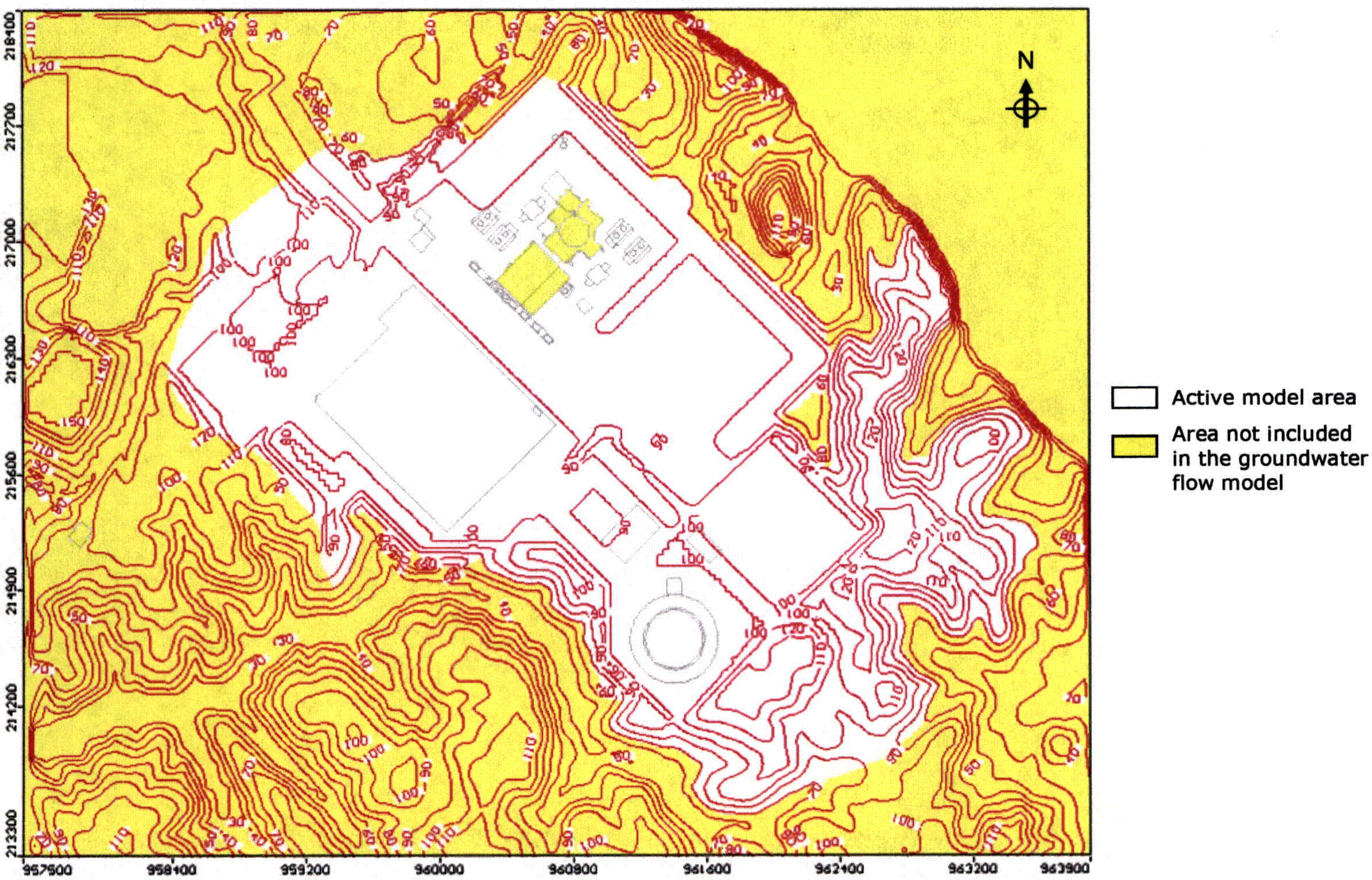


Figure 2.3-~~XB~~ 86: Topography of the post-construction groundwater flow model domain