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SOUTHERN COMPANY
Energy to Serve Your World℠

AUG 21 2008

Docket No.: 52-011

AR-08-1286

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Southern Nuclear Operating Company
Vogtle Early Site Permit Application
Response to Request for Additional Information Letter No. 11
Involving Groundwater

Ladies and Gentlemen:

By letter dated March 31, 2008, Southern Nuclear Operating Company (SNC) submitted Revision 4 to the Vogtle Early Site Permit (ESP) Application to the U.S. Nuclear Regulatory Commission (NRC). This revision of the ESP application also contains a request for issuance of a Limited Work Authorization (LWA) for Vogtle Electric Generating Plant Units 3 and 4 site. Subsequently, by letter dated July 22, 2008, the NRC provided SNC with Request for Additional Information (RAI) Letter No. 11 identifying further information needs required by the NRC to complete its detailed safety review of the ESP application and LWA request. The topics covered in the RAI letter are related to ESP application Site Safety Analysis Report (SSAR) Sections 2.4.12, 2.5.2 and 3.8.5. SNC's response to RAI Letter No. 11 involving SSAR Sections 2.5.2 (Vibratory Ground Motion) and 3.8.5 (Foundations) was provided in an SNC letter dated August 14, 2008. SNC's response to RAI Letter No. 11 involving SSAR Section 2.4.12 (Groundwater) is provided in Enclosure 1 to this letter. Associated groundwater model input/output files are provided on compact disc (C/D) in Enclosure 2. In addition, updated figures for SSAR Appendix 2.4B are provided in Enclosure 3.

The SNC contact for this RAI response letter is J. T. Davis at (205) 992-7692.

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NRO

Ms. M. M. Caston states she is General Counsel and Vice President of External Affairs for Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Moanica M. Caston

Sworn to and subscribed before me this 21st *day of* August*, 2008*

Dana M. Williams
Notary Public

My commission expires: 12/29/2010

MMC/BJS/dmw

Enclosures:
1. Response to NRC RAI Letter No. 11 for the Vogtle ESP Application Involving Groundwater
2. Groundwater Model Input / Output Data Files (C/D)
3. Updated SSAR Appendix 2.4B Revision 4-S2 Figures

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Southern Nuclear Operating Company

AR-08-1286

Enclosure 1

Response to NRC RAI Letter No. 11

for the Vogtle ESP Application

Involving Groundwater

Model Analyses Background

In order to address NRC concerns reflected in the following RAIs, additional sensitivity analyses were run on the baseline groundwater model previously submitted on June 26, 2008, as Appendix 2.4B of Vogtle ESP Application (ESPA) Revision 4, Supplement 2. The results indicate that the conclusions of ESPA Appendix 2.4B remain valid, and thus an Appendix 2.4B revision is not required, except as discussed in the following paragraph. These sensitivity analyses to the base model reflect discussions held with the NRC in a hydrology teleconference on August 6, 2008.

Enclosure 2 to this letter provides Visual Modflow input/output model files for NRC review. During the preparation of these model files for submittal, it was discovered that three figures included in the June 26, 2008 submittal of Appendix 2.4B need to be revised. Figures 30 and 32 were correctly titled, but the figure content inadvertently duplicated to other figures. In addition, the titles of Figures 47 and 48 did not reflect the hydraulic conductivity (K) values provided in Table 8. Model 7 was correctly run using the correct hydraulic conductivity values. Only the titles are being changed. The four revised figures are shown in Enclosure 3. They will be included in ESP Application, Revision 5.

2.4.12-4 Provide input and output files electronically for the following model runs; Model 3, run 305; Model 5, run 504; Model 6, run 612; and Model 7, run 708. These files should enable NRC staff (1) to understand changes to Southern's modeling effort (e.g., mass balance, convergence), (2) to better understand the modeling assumptions associated with key regions of the model domain, and (3) to evaluate the key elements of the conceptual model identified by Southern, (e.g., the high hydraulic conductivity region upgradient of Mallard Pond, the low hydraulic conductivity region in the southwest model quadrant, the five recharge zones).

Response:

The input and output files for the requested models are provided in Enclosure 2. In addition to those files, the following four folders with Visual Modflow input and output files are also provided in Enclosure 2: 721, 721-pc, 908, 908-pc. A brief description of the models included in these folders is provided below.

721: This folder contains the baseline model described in these responses. The model parameters used in this model produce the simulation presented in Figure 6, Figure 7, and Figure 8. This model uses the hydraulic conductivity distribution shown in Figure 3, and the groundwater recharge distribution shown in Figure 4. To obtain the results of some of the sensitivity analyses presented as part of the RAI responses (e.g. in Figure 14 and Figure 15), the user must adjust the input data accordingly.

721-pc: The folder contains a model for the post construction conditions, based otherwise on the same assumptions as model 721. Model 721-pc differs from 721 in that it includes a hydraulic conductivity zone representing the backfill material in the power block of Units 3 & 4 (see Figure 16), and a groundwater recharge distribution that accounts for the construction of Units 3 & 4, new paved and compacted gravel areas, etc (see Figure 17). This model was used to produce the results presented in Figure 18 and Figure 19.

908: This folder includes the model with the high hypothetical hydraulic conductivity zone that was use to demonstrate the assumptions required to produce pathways from Units 3 & 4 to the west and to the south. This model was used to produce the results presented in Figure 10, Figure 11,

Figure 12 and Figure 13. The parameter values in the input files in folder 908 produce the simulation presented in Figure 10 and Figure 11. To produce the simulation results presented in Figure 12 and Figure 13, the hydraulic conductivity of the hypothetical highly conductive zone to the west and south of Units 3 & 4 must be changed to 360 ft/day.

908-pc: The folder contains a model for the post construction conditions, based otherwise on the same assumptions as model 908. Model 908-pc differs from 908 in that it includes a hydraulic conductivity zone representing the backfill material in the power block of Units 3 & 4 (see Figure 20), and the groundwater recharge distribution that accounts for the construction of Units 3 & 4, and new paved and compacted gravel areas, etc (per Figure 17). This model was used to produce the results presented in Figure 20 and Figure 21. The parameter values in the input files for folder 908-pc produce the simulation presented in Figure 20. To produce the simulation results presented in Figure 21, the hydraulic conductivity of the hypothetical highly conductive zone to the west and south of Units 3 & 4 must be changed to 360 ft/day.

2.4.12-5 Provide a version of the baseline groundwater model (i.e., the model of the existing water table aquifer) that better accounts for the field data concerning both (1) the known groundwater high (which lies below the proposed cooling towers) and (2) the topography and flow around the tributary to Daniels Branch (which is to the west of the cooling tower area proposed for Units 3 and 4). The model should provide a plausible conservative representation of the real system in order to address whether changes in the hydrology necessary to cause a shift in the groundwater flow path are plausible.

The model should also better simulate flow associated with the tributary to the Daniels Branch. According to the wetland report submitted by Southern (see January 2007 submittal), the tributary to Daniels Branch that lies to the west of the cooling tower area includes segments of an ephemeral stream (adjacent to OW-1007), wetland, and a perennial stream. The perennial stream is upstream of Lower Debris Basin 2. The baseline model could exhibit groundwater flow toward each of these segments of the stream during the wetter period of the year (e.g., March); determine whether it should do so for the perennial stream segment as well. In the real setting based on groundwater observations, groundwater flow occurs from the proposed cooling tower area to the tributary to Daniels Branch; however, in the simulated setting it does not. Furthermore, the potentiometric surface shown for Model 7 (see Figure 50) suggests that groundwater flow occurs across or through the streambed and continues in a northerly direction even though the topographic data suggests the streambed is below the groundwater level in this vicinity. To the extent that the groundwater model does not appear to acknowledge the presence of the streambed, assess whether the perennial stream segment may be better represented by a constant head boundary condition rather than a "drain."

Response:

Sensitivity analyses were run on the groundwater model as described above. Specific changes to the model include:

1. The topography used to define the top of the groundwater model was refined. The ground surface elevation was imported in the model using a grid of 30 ft by 30 ft in the part of the model domain

covered by the LIDAR survey and 92.5 ft by 92.5 ft in the remainder of the model domain where the topography was obtained from USGS DEM files.

These data were used to obtain the ground surface elevation at the center of each model cell using the kriging interpolation option available in Visual Modflow. A grid of 200 by 200 nodes was used for the kriging interpolation used in Visual Modflow.

2. The tributary to Daniels Branch, located west of proposed Units 3 & 4, was represented by a combination of drain and constant head cells (Figure 1). Most of the streambed of this tributary is represented by drain cells. The drain elevation at these cells was set equal to the stream invert elevation based on topographic data. A pond exists upstream of Debris Basin # 2. This pond was most likely created by a beaver dam. A photograph of this pond taken on April 22, 2008 is shown in Figure 2. It is noted that no rainfall had been recorded in the 30 days prior to that date. This pond can also be seen in aerial photographs of this area, suggesting that it is a permanent feature. Therefore, the area of the pond was represented in the model by constant head cells at elevation 150 ft.

3. Three new recharge zones were introduced in the model (see Figure 3):

   - Nearly horizontal areas covered with gravel, which are expected to have relatively higher recharge than horizontal areas, and areas on mild slopes with grass. This zone is mostly around the area of Unit 3 & 4, which served as the construction yard for Units 1 & 2 (zone R_7 in Figure 3).

   - Nearly horizontal but well drained areas around the power block of Units 1 & 2, where runoff is collected and recharge is expected to be relatively low (zone R_8 in Figure 3).

   - Nearly horizontal graded areas with compacted gravel around Units 1 & 2 (e.g. the switchyard area), where recharge can be high, but less than in areas where the gravel has not been compacted (zone R_9 in Figure 3).

4. The hydraulic conductivity distribution was revised to improve the agreement between model and data. Figure 4 shows the delineation of the hydraulic conductivity zones used in the baseline model. These zones include the backfill material used for the construction of Units 1 & 2 (K_2 in Figure 4), a zone that encompasses part of the area where the Utley limestone is present (K_3 in Figure 4), and a low conductivity zone to the west of Units 3 and 4 (K_4 in Figure 4). The rest of the model domain is treated as a uniform hydraulic conductivity zone (K_1 in Figure 4).

   An overview of the process and the rationale used for the development of the zones shown in Figure 4 is provided below. Different combinations of the extent and hydraulic conductivity value of zone K_4 were evaluated in the effort to improve the agreement between simulated and measured groundwater levels. As zone K_4 neighbors zone K_3, adjustments in the extent of zone K_4 also affected the extent of zone K_3. In addition to the baseline model, which consists of the four hydraulic conductivity zones described above, the model changes described under items (1) through (3) above, were also introduced in different models 1 through 7 described in Appendix 2.4B. The baseline model presented here is a modified version of Model 7 in Appendix 2.4B. It has the same general hydraulic conductivity zones as Model 7 presented in Appendix 2.4B, but differs in the extent of the low conductivity zone to the west of Units 3 & 4.

The seven models that were evaluated to arrive at the baseline model are:

Model 1: uniform hydraulic conductivity (except in the backfill area of Units 1 & 2) and recharge over the entire model domain

Model 2: uniform hydraulic conductivity over the entire model domain (except in the backfill area of Units 1 & 2), but spatially variable recharge

Model 3: hydraulic conductivity as a function of the thickness of the Utley limestone. For this purpose the available borehole data were reinterpreted to derive the contours of the thickness of the Utley limestone presented in Figure 5.

Model 4: uniform hydraulic conductivity over the area of the Utley limestone, and a different single hydraulic conductivity elsewhere

Model 5: same as Model 4 with an added high hydraulic conductivity zone upstream of Mallard Pond

Model 6: like Model 5 with an added low hydraulic conductivity zone to the west and southwest of the area of Units 3 & 4.

Model 7: the baseline model described above.

Figure 6 shows the equipotential contours for the shallow (water table) aquifer computed with the baseline model, together with the residuals at the wells for which observation data area available. As can be seen in Figure 6, the location of the groundwater high produced by the model is very close to the location of the observed groundwater high, which lies below the proposed cooling towers.

Figure 7 is a plot of the computed vs. measured heads at all the observation wells. It also gives some basic statistics for the accuracy of the calibration. As can be seen in Figure 7, the root mean squared (RMS) residual is 1.514 ft and the normalized RMS is 4.702 percent. The maximum residual is 3.155 ft at observation well LT-7A/A. Because the location of the observation wells does not coincide with the center of the groundwater model cells, the residuals shown in Figure 7 are based on interpolated values of the head. In other words, Figure 7 compares the value calculated at each observation point against the observed value at the same point. The value calculated at each observation point is obtained by interpolating calculated values from surrounding cells to the observation point location.

A similar comparison based on the computed values at the cells containing each observation well is shown in Figure 8. Figure 8 suggests a slightly less accurate agreement between model and observed conditions. For example, the maximum residual shown in Figure 8 is -3.572 ft at well 179/A compared with 3.155 in Figure 7. This is to be expected because of the grid size (100 ft by 100 ft), which means that the compared values can be up to 50 ft (i.e. half the cell size) away.

It is noted that the residuals displayed in Figure 6 are based on the computed values at the cells that contain an observation well. Visual Modflow does not provide an option for displaying on a map the residuals based on interpolated values at the actual location of the observation wells. The mass balance error (i.e. the difference between inflow and outflow) for this simulation is -0.02 percent.

2.4.12-6 **Provide a further assessment of the assignment of infiltration rates, with special attention to the potential for higher infiltration in the immediate vicinity of the groundwater high that occurs beneath and adjacent to the proposed cooling towers for Units 3 and 4. The presence of highs or lows in the potentiometric surface of an aquifer suggests sources or sinks of groundwater, respectively. In the case of a broad region of uniform hydraulic conductivity, the presence of a groundwater high suggests a topographic high or a greater amount of infiltration. The region of interest is an area that was reshaped during construction of the existing units, and as a result is relatively flat and may present an opportunity for minimal runoff and maximum recharge. In addition, the presence of asphalt roadways and concrete pads may contribute to runoff to areas prone to infiltration (unlined ditches, water retention basins), with infiltration rates locally approaching if not exceeding precipitation because of the collection area aspect of ditches and basins.**

Response:

Three new recharge zones were defined in addition to the zones described in Appendix 2.4B.

The first new recharge zone (R_7 in Figure 9) covers most of the area that was reshaped during construction of the Units 1 & 2, and as a result is relatively flat, covered mostly with gravel, which may present an opportunity for minimal runoff and maximum recharge. Most of this area was used as the construction yard for Units 1 & 2.

Nearly horizontal graded areas covered with compacted gravel (e.g. the switchyard and other areas around Units 1 & 2) were defined as another recharge zone (R_9 in Figure 9). Recharge over this zone is high but less than zone R_7.

Finally, an area of relatively low recharge was defined to describe the well-drained areas around the power block of Units 1 & 2 (R_8 in Figure 9).

Using these new recharge zones with the values indicated in Figure 9 contributed to the improved calibration of the groundwater model and its ability to simulate the local groundwater high that occurs beneath, and adjacent to, the proposed cooling towers for Units 3 and 4 (see Figure 6).

2.4.12-7 **Based on the revised baseline model incorporating the further assessment of infiltration rate assignments – i.e., the most plausible conservative conceptual model of today's site – provide an analysis of (1) the magnitude of change in hydraulic conductivity, if any, that would cause a groundwater flow path to exist to the west or southwest from the power block area, (2) the spatial distribution and magnitude of infiltration rate changes, if any, that would cause a groundwater flow path to exist to the west or southwest of the power block area, and (3) combinations of the above.**

Response:

Several hydraulic conductivity and recharge distribution and values were evaluated to determine a combination of values that could produce a groundwater flow path to the west, south or southwest of the Units 3 & 4 power block area.

After evaluating a large number of combinations of hydraulic conductivity values for the conductivity zones in the baseline model (see Figure 4), it was concluded that it is not possible to produce groundwater pathways from the power block area to the west, south or southwest without significant deviation from the observed groundwater levels.

Such pathways could be produced only by changing the delineation of the hydraulic conductivity zones and introducing a high conductivity zone west and south of the power block of Unit 3 & 4.

Figure 10 shows the hypothetical zones and values of hydraulic conductivity that would be required to produce some pathways to west and to the south. The introduction of such a high conductivity zone over the southern half of the model domain shifts the groundwater high to the north of the power block of Units 1 & 2, and lowers overall water levels. The hydraulic conductivity of this hypothetical zone is 200 ft/day. The hydraulic conductivity values of all other zones and the groundwater recharge rates are the same as in the baseline case. Figure 11 compares the simulated and computed heads using the hydraulic conductivity distribution shown in Figure 10. As can be seen in Figure 11, this simulation substantially underestimates the measured heads. The root mean square residual is for this simulation is 11.008 ft, suggesting that this is not a plausible model.

Figure 12 shows another hypothetical case that produces pathways to the south. The hydraulic conductivity of this hypothetical conductivity zone is 360 ft/day. Figure 13 compares the observed and computed heads for this simulation. Again, the computed heads are significantly lower than the measured values, with a root mean square residual of 12.175, suggesting this hydraulic conductivity distribution is also not plausible.

Different combinations of infiltration rates were also evaluated. None of these combinations could produce pathways to the west, south or southwest. Figure 14 shows such an example. The simulated heads and particle tracks shown in this figure were obtained using the baseline model and increasing the infiltration value over the nearly horizontal areas covered with gravel (recharge zone R_7 in Figure 9). To obtain a bounding simulation, the infiltration rate used was 48 in/yr (i.e., about equal to the mean annual precipitation). As can be seen in Figure 14, groundwater levels are higher than represented in the baseline case, but all pathways originating around the power block of Units 3 & 4 remain to the north, toward Mallard Pond. Figure 15 shows the simulated heads and pathways for the case that recharge over zone R_7 is zero. In this case again, all pathways from Units 3 & 4 are directed to the north. The results shown in Figure 14 and Figure 15 provide bounding estimates of groundwater levels for a broad range of values of groundwater recharge over zone R_7, from zero to the maximum mean annual precipitation. The results of numerous other combinations of recharge rates over the zones shown in Figure 9 were similar (i.e., they showed that all pathways originating around Units 3 & 4 are to the north).

Note: None of the RAIs specifically refer to the application of the baseline model to post-construction conditions. The following addresses this subject and is submitted as a supplement to the RAI responses.

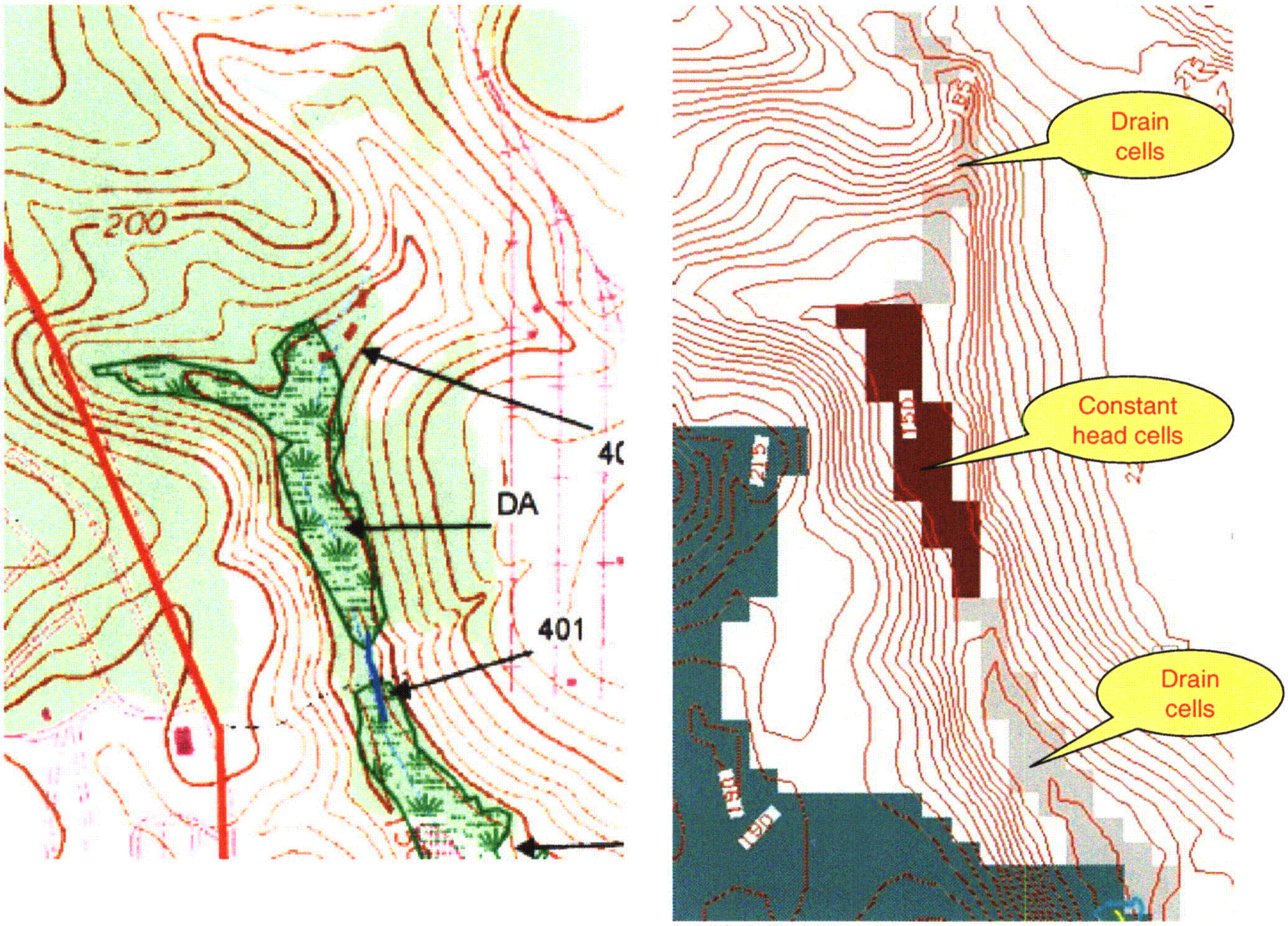
The baseline model was used to simulate groundwater conditions after the construction of Units 3 & 4. For this purpose, the model was modified to include the backfill material in the area of Units 3 & 4 (zone K_5 in Figure 16). It is assumed that the hydraulic conductivity of the backfill material that will be used for the construction of Units 3 & 4 is the same as the backfill used for Units 1 & 2 (i.e., 3.3 ft/day). The recharge distribution in the area of Units 3 & 4 was also modified as shown in Figure 17. Recharge around Units 3 & 4 for post-construction conditions is treated the same way as recharge around Units 1 & 2. Zone R_9 represents areas of compacted gravel and zone R_8 represents well drained areas around the power block.

Figure 18 shows the simulated heads and particle tracking under these assumptions. The particle tracks shown in Figure 18 originate along the periphery of a 750-ft radius circle that encompasses the power block of Units 3 & 4. All particle tracks end up in Mallard Pond. Figure 19 shows the path followed by a particle originating at the auxiliary building of Unit 4, which is the closest unit to Mallard Pond. The travel time from the auxiliary building of Unit 4 to Mallard Pond is 5826 days or 15.95 years. The first 4950 days, or 13.55 years, of this time is spent in the backfill material. These travel times are longer than those presented in ESPA Revision 4, Supplement 2, Appendix 2.4B.

Figure 20 shows the pathways of 20 particles released along the periphery of a 750-ft circle encompassing the power block of Units 3 & 4, using the very high hydraulic conductivity distribution of the hypothetical case presented in Figure 10, accounting for the backfill material that will placed during the construction of Units 3 & 4, and applying the recharge rates representing post-construction conditions around Units 3 & 4 (see Figure 17). It is assumed that the hypothetical hydraulic conductivity of this conductivity zone is 200 ft/day. As can be seen in Figure 20, because of the effect of the lower conductivity of the backfill, the groundwater pathways starting around the power block of Units 3 & 4 are somewhat different than under pre-construction conditions, in that there is no projected flow to the west or south.

A similar simulation for post construction conditions using the assumptions of the simulation shown in Figure 12 and including the backfill material and the post-construction recharge distribution around Units 3 & 4 produces some pathways to the south (see Figure 21). In the simulation of Figure 21, the hydraulic conductivity of this hypothetical conductivity zone is 360 ft/day.

The results shown in Figure 20 and Figure 21 do not represent the expected post-construction conditions because they are based on the unrealistic assumption of a very high conductivity to the west and south of Units 3 & 4. They are presented here only for the purpose of extrapolating the hypothetical cases presented in Figure 10 and Figure 12 to post-construction conditions.



(a) Wetlands (from Ref. 1)

(b) Model boundary conditions

Figure 1 - Wetlands on the tributary to Daniels Branch west of proposed Units 3 & 4 and boundary conditions used in the groundwater model.

Figure 2 - Pond on the tributary to Daniels Branch upstream of Debris Basin # 2. Photograph taken on April 22, 2008.

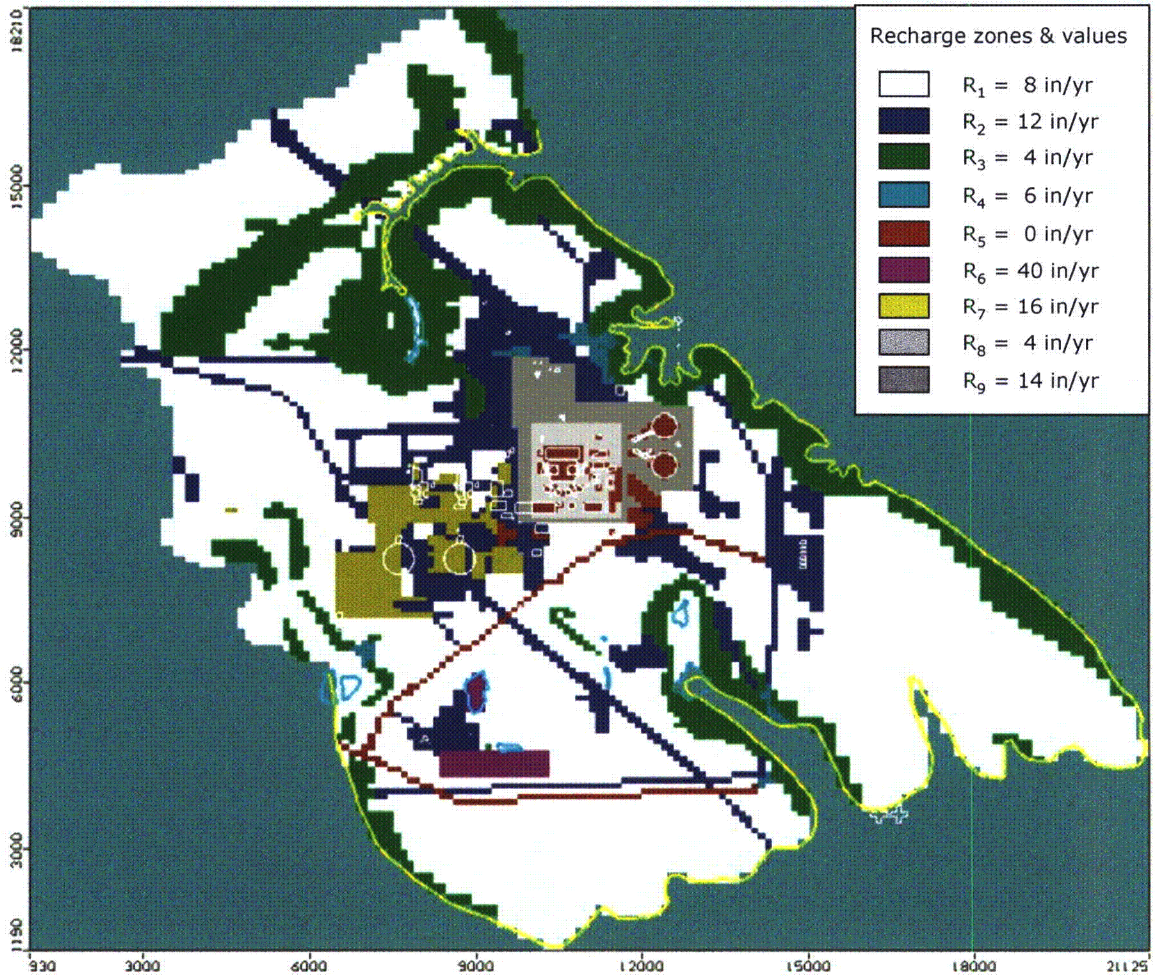


Figure 3 - Recharge zones used in the baseline groundwater model

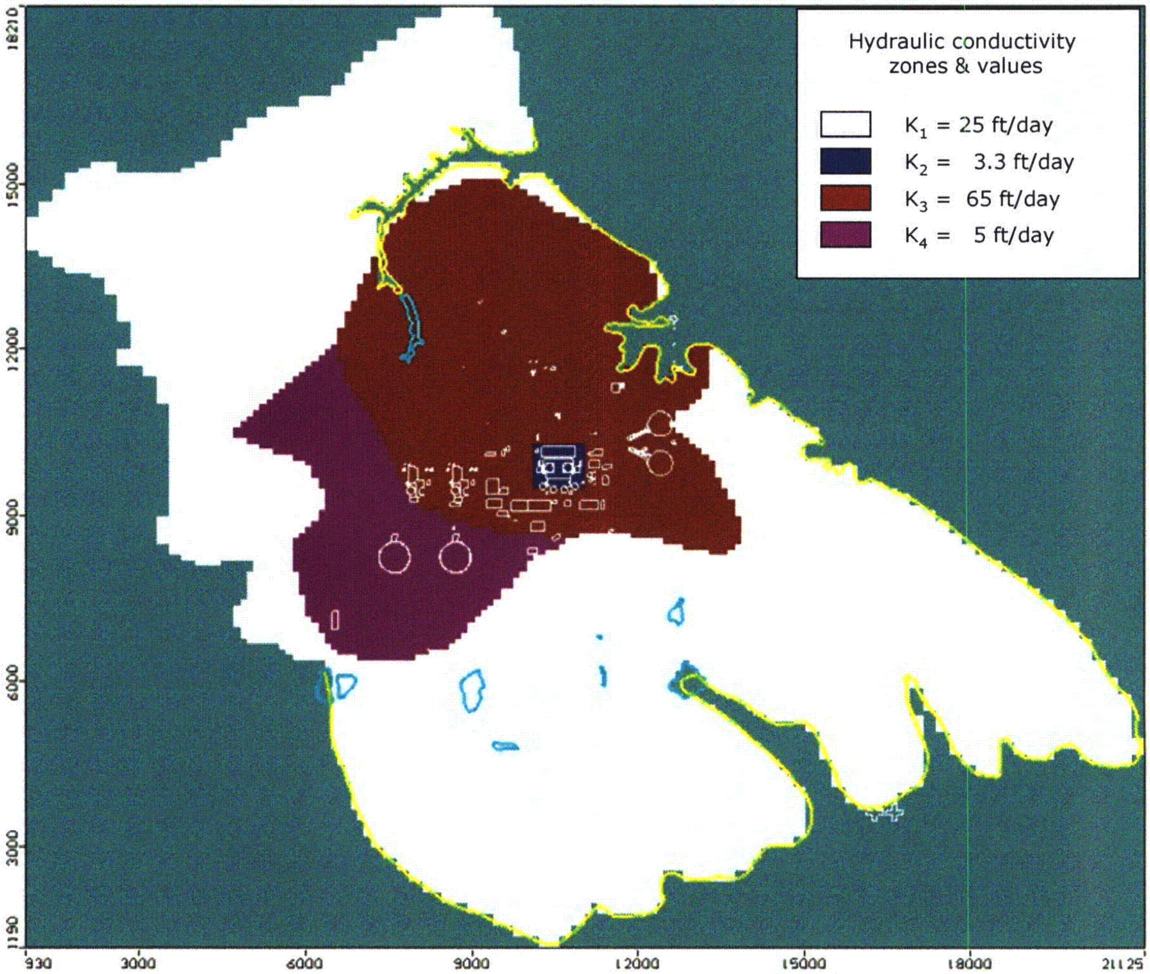


Figure 4 - Hydraulic conductivity zones in the baseline groundwater model.

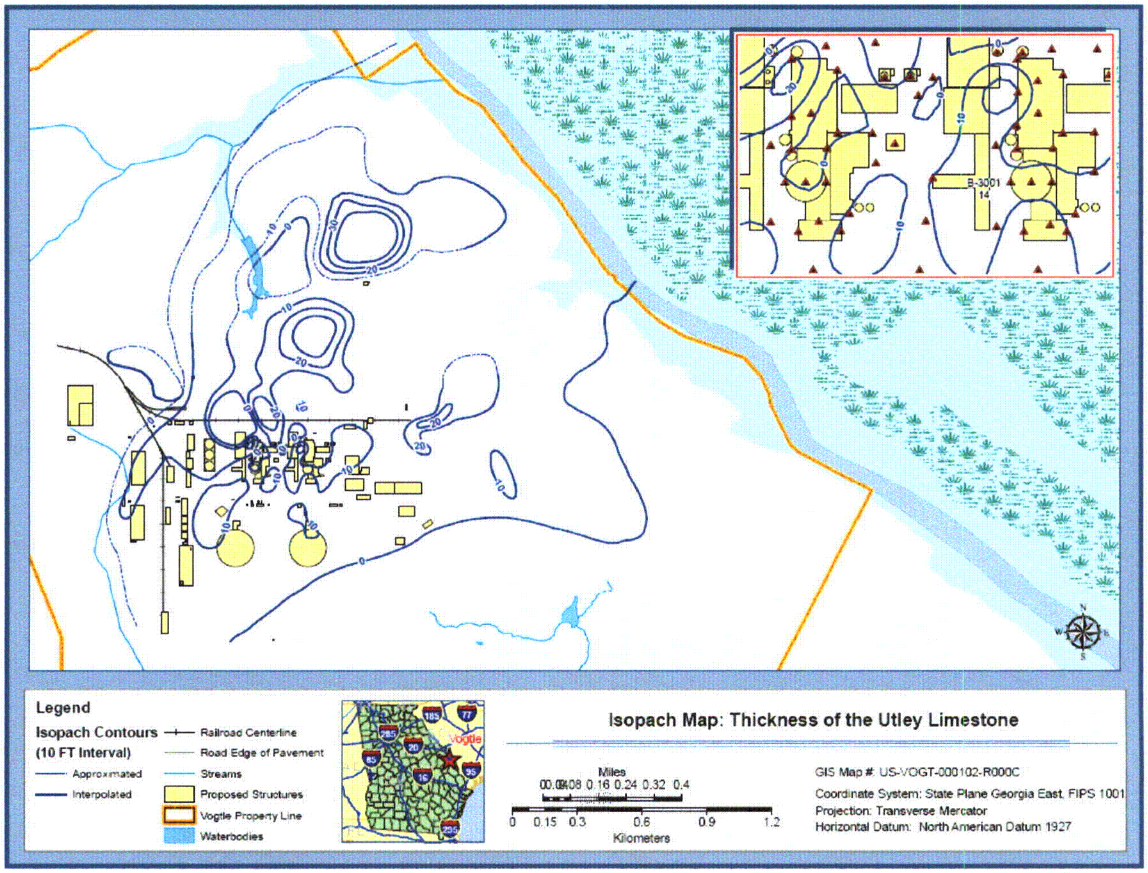


Figure 5 - Isopachs of the Utley limestone.

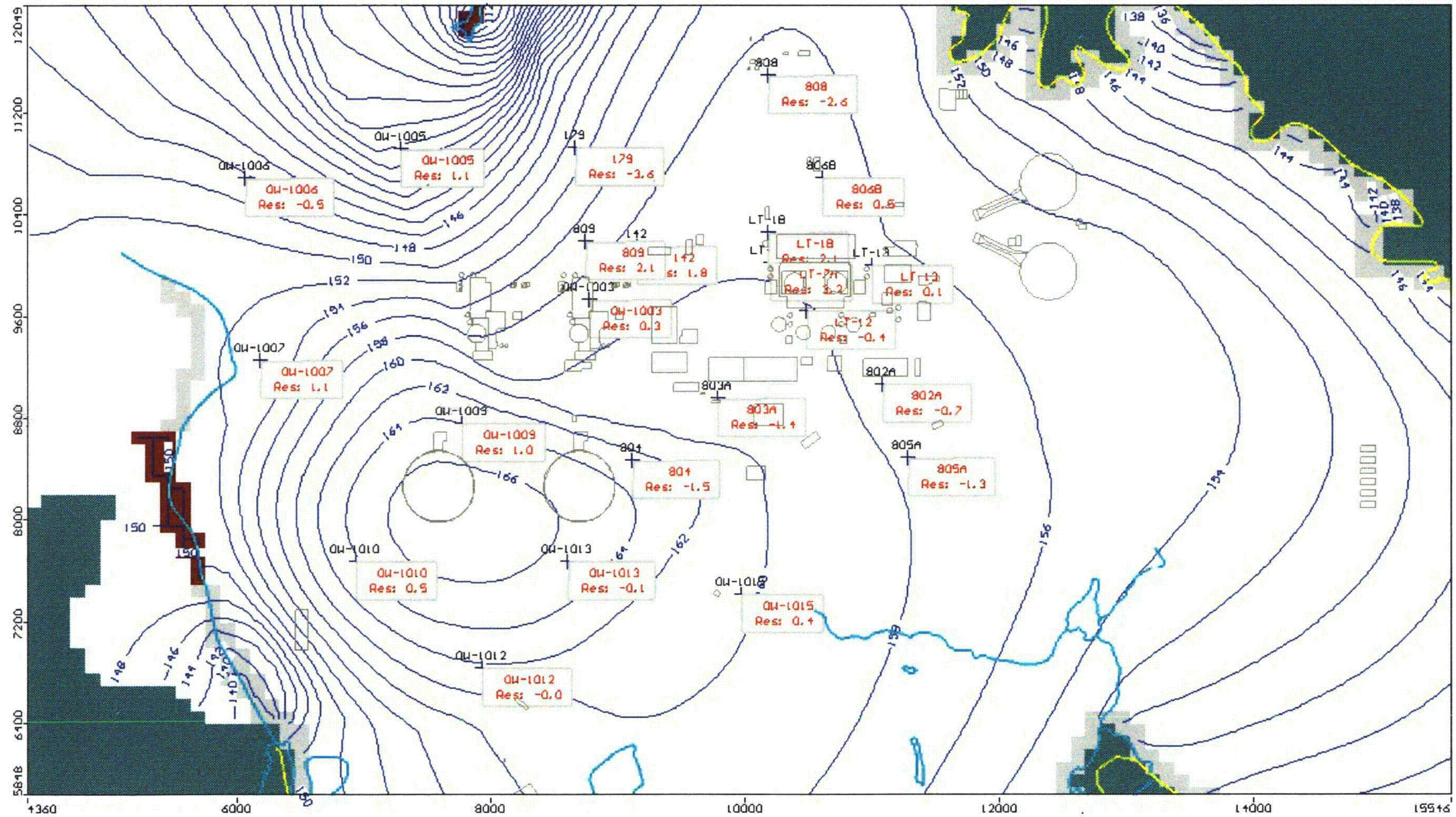


Figure 6 - Equipotential contours and residuals obtained with the baseline model.

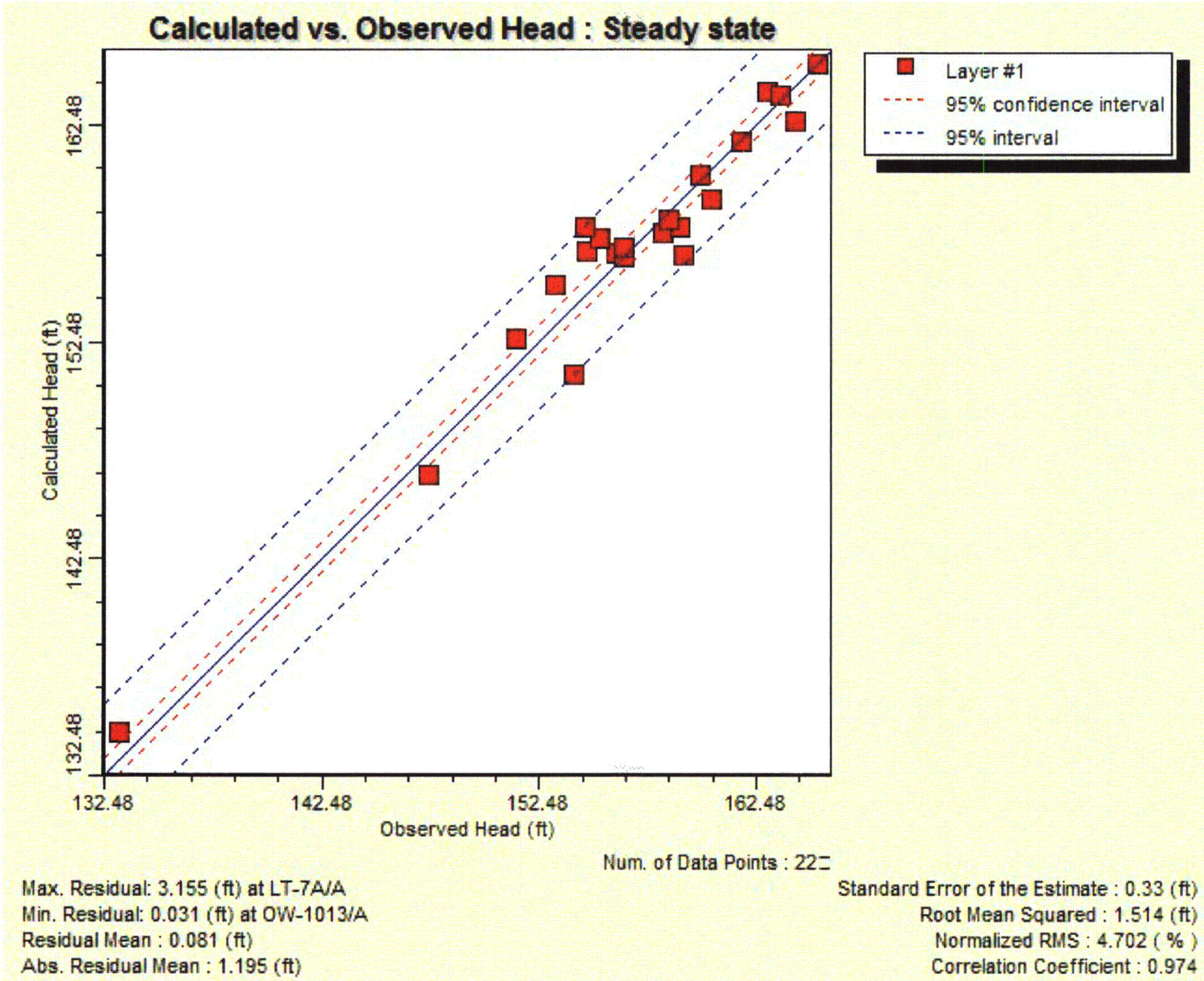


Figure 7 - Calculated vs. observed heads and calibration statistics based on interpolated values at the observation wells.

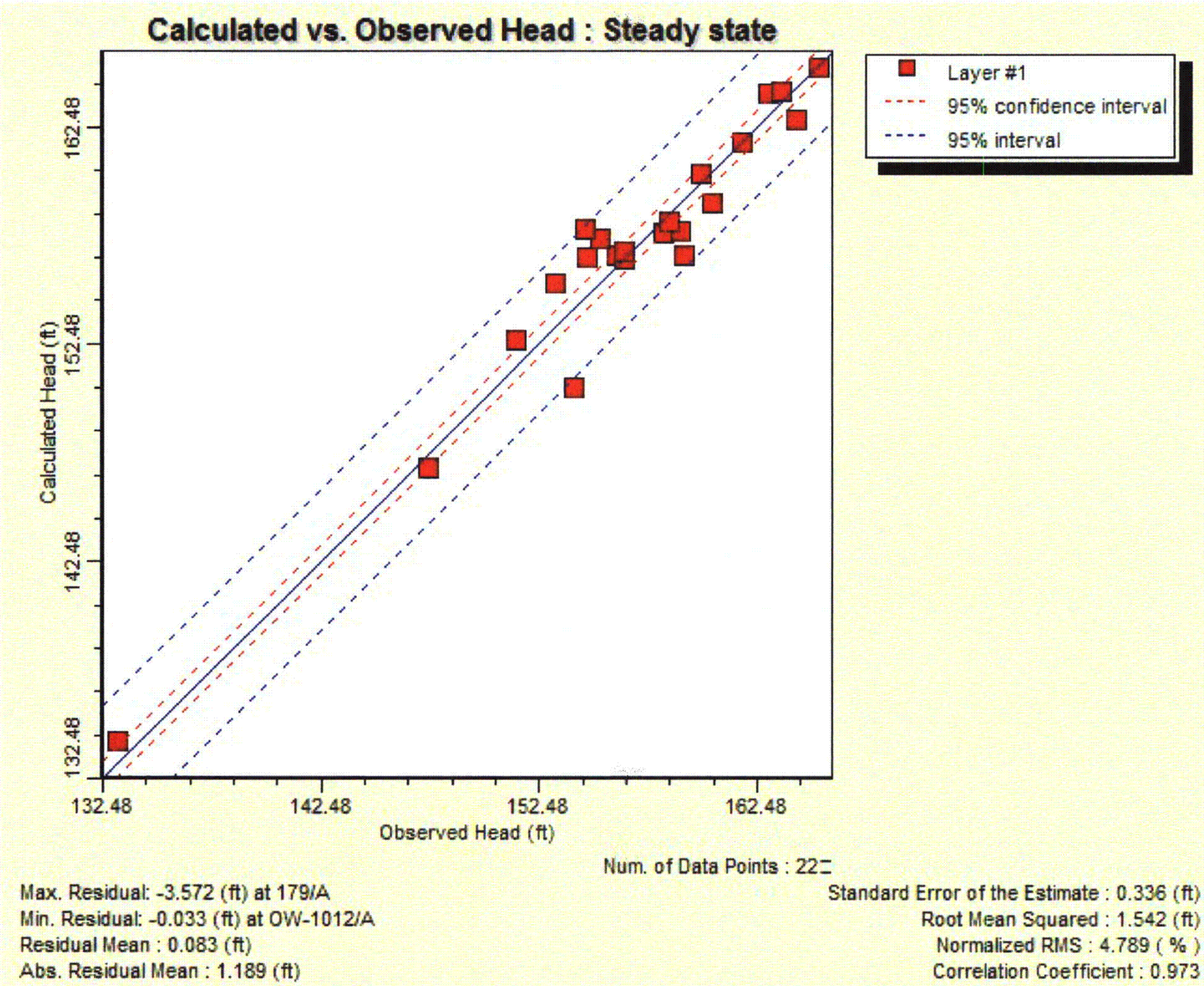


Figure 8 - Calculated vs. observed heads and calibration statistics based on the computed values at the cells containing each observation well.

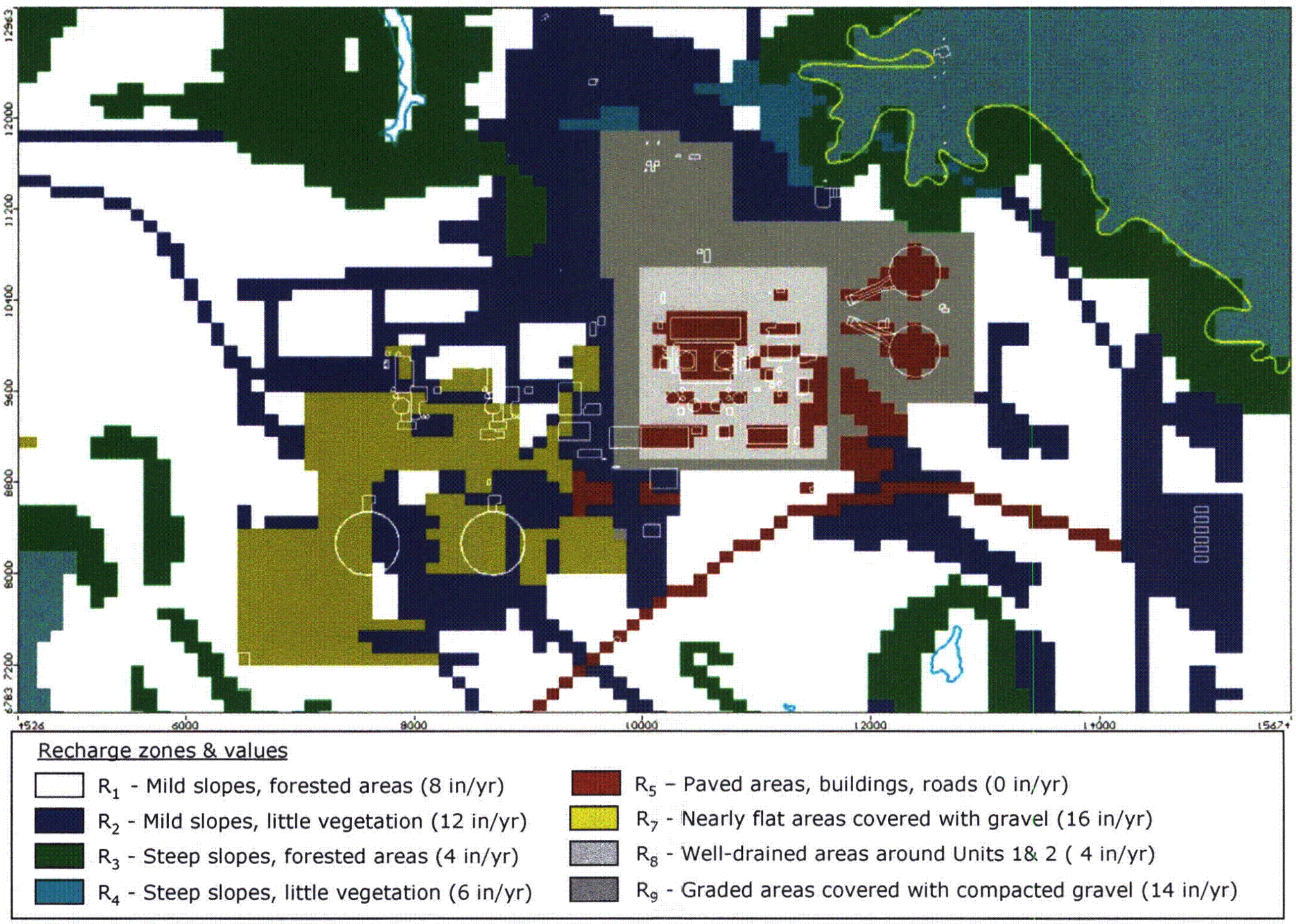


Figure 9 - Recharge zones around Units 1 & 2 and the proposed Units under present conditions.

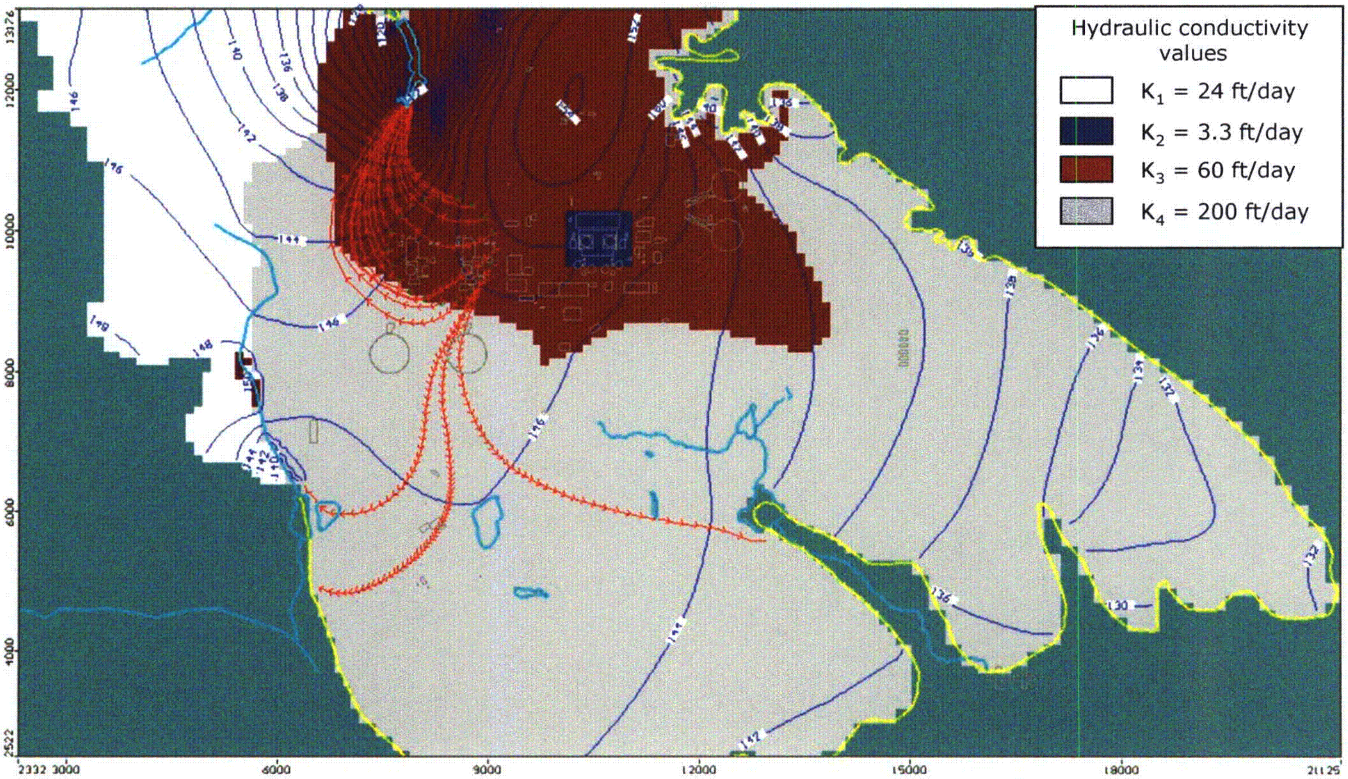


Figure 10 - Simulated heads and particle tracking for a hydraulic conductivity distribution that produces groundwater pathways to the south.

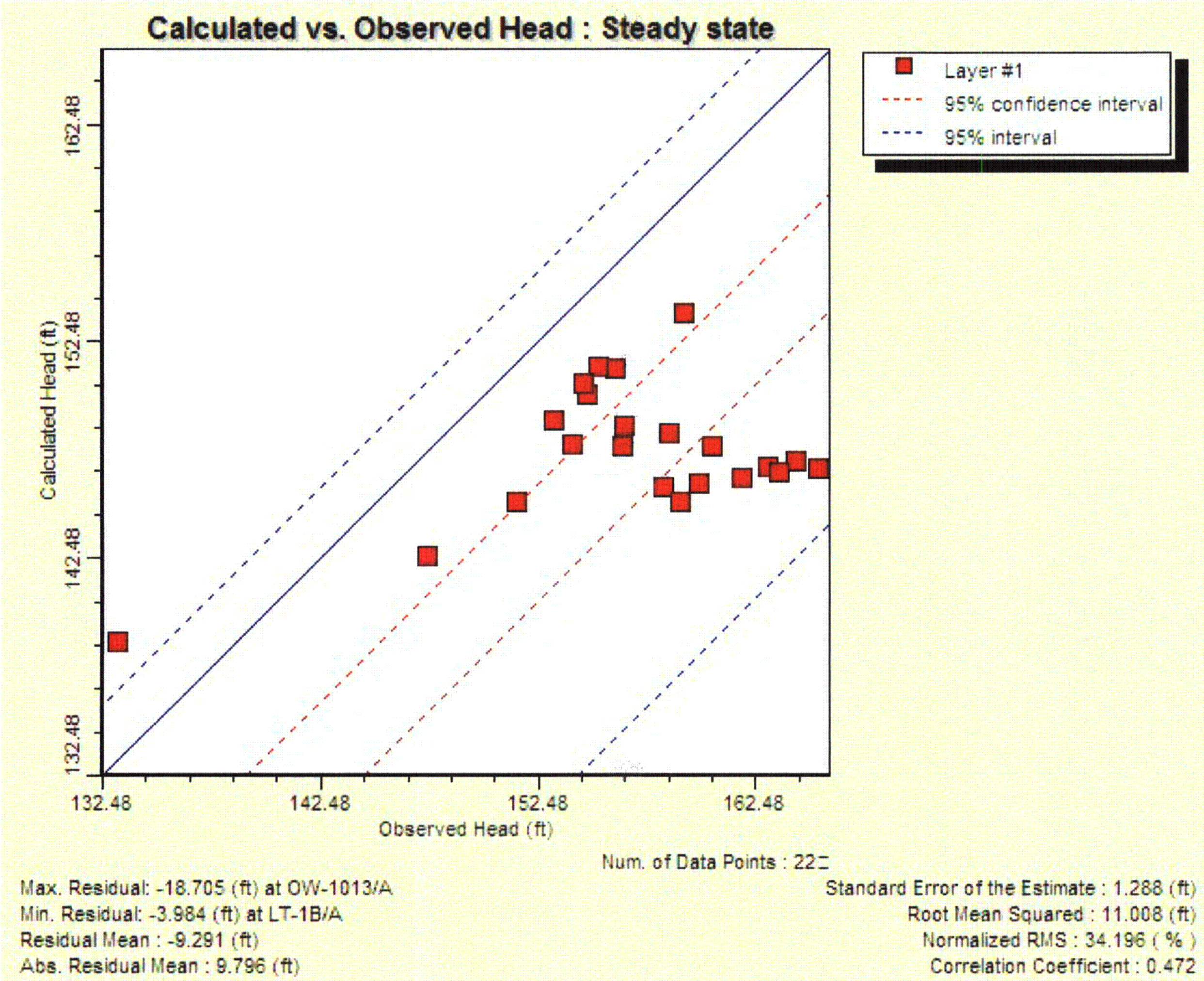


Figure 11 - Comparison of observed and computed heads for the hydraulic conductivity distribution shown in Figure 10.

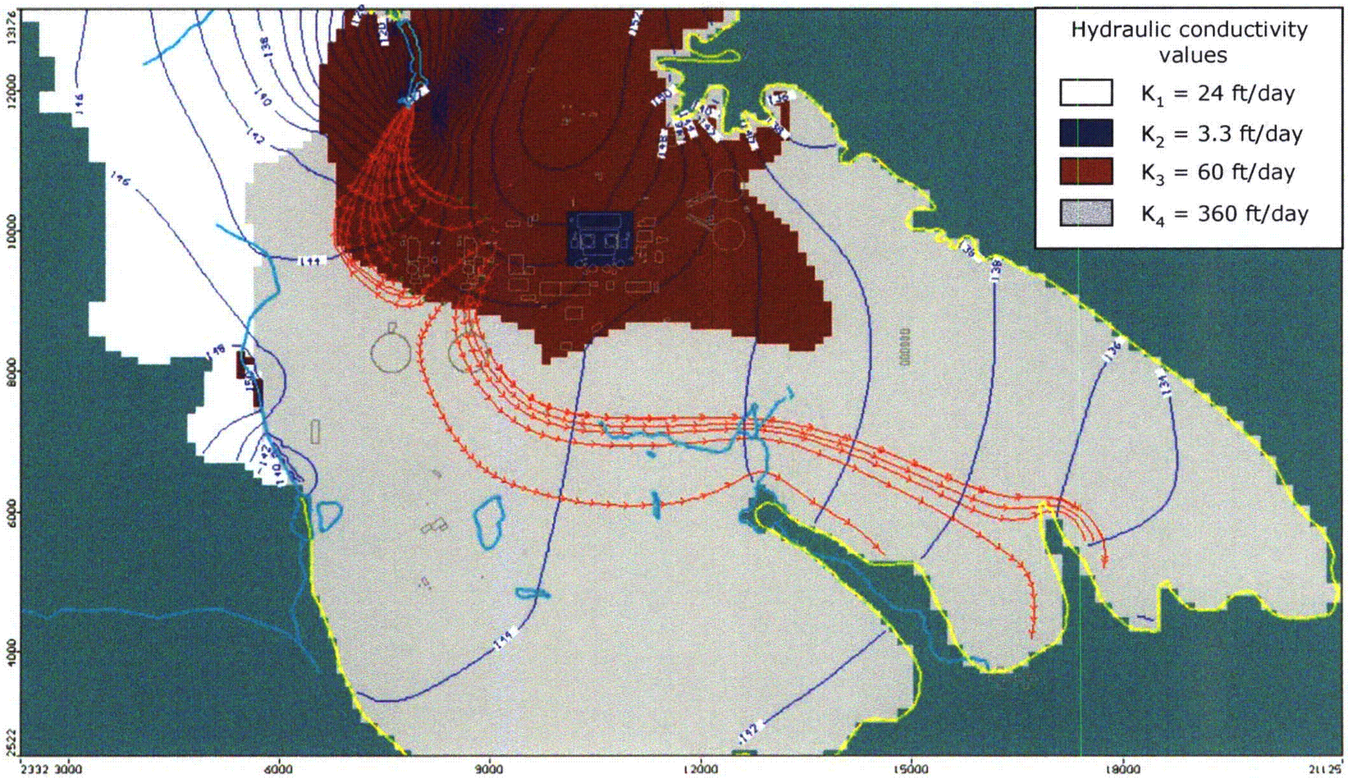


Figure 12 - Simulated heads and particle tracking for a hydraulic conductivity distribution that produces groundwater pathways to the south.

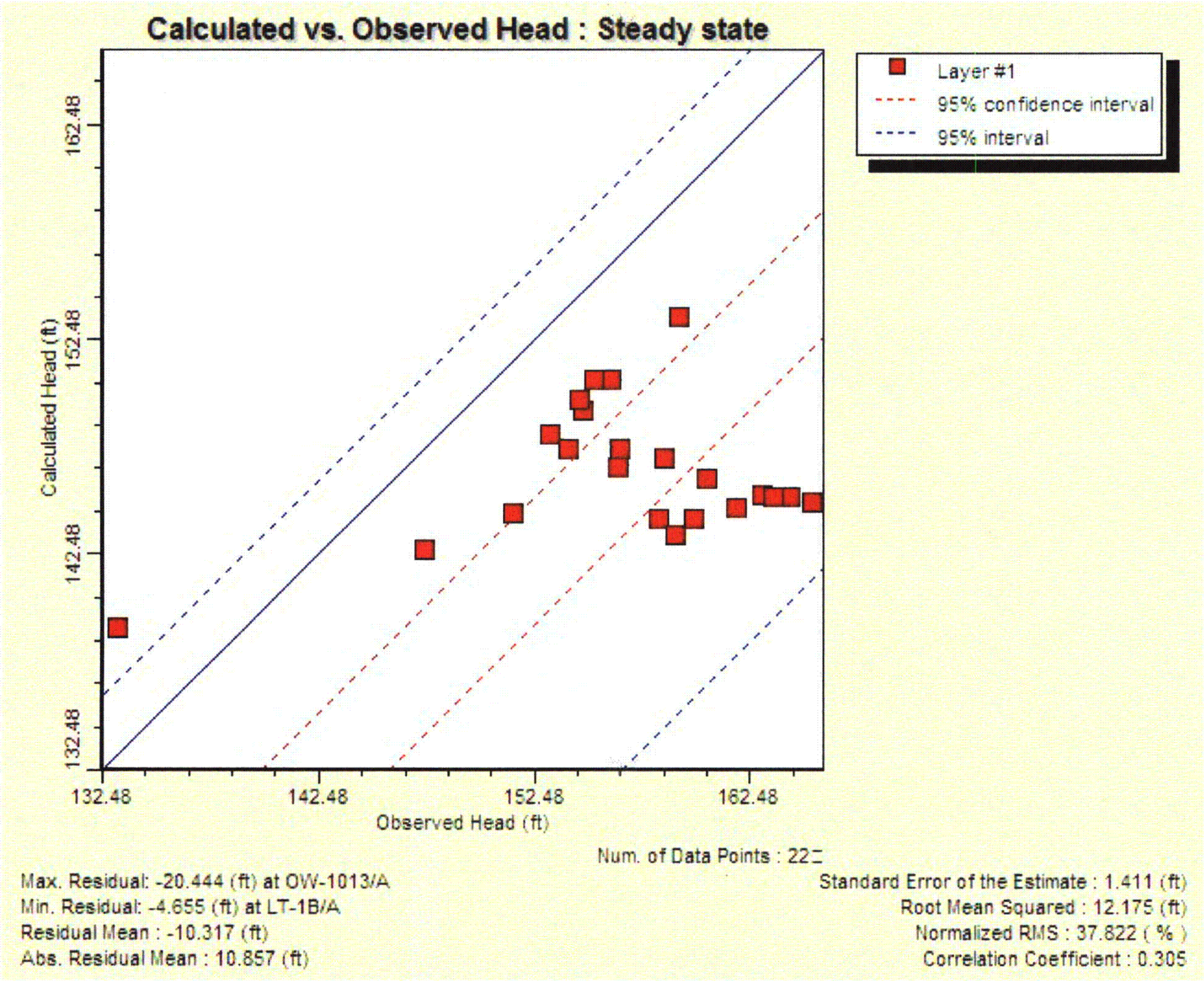


Figure 13 - Comparison of observed and computed heads for the hydraulic conductivity distribution shown in Figure 12.

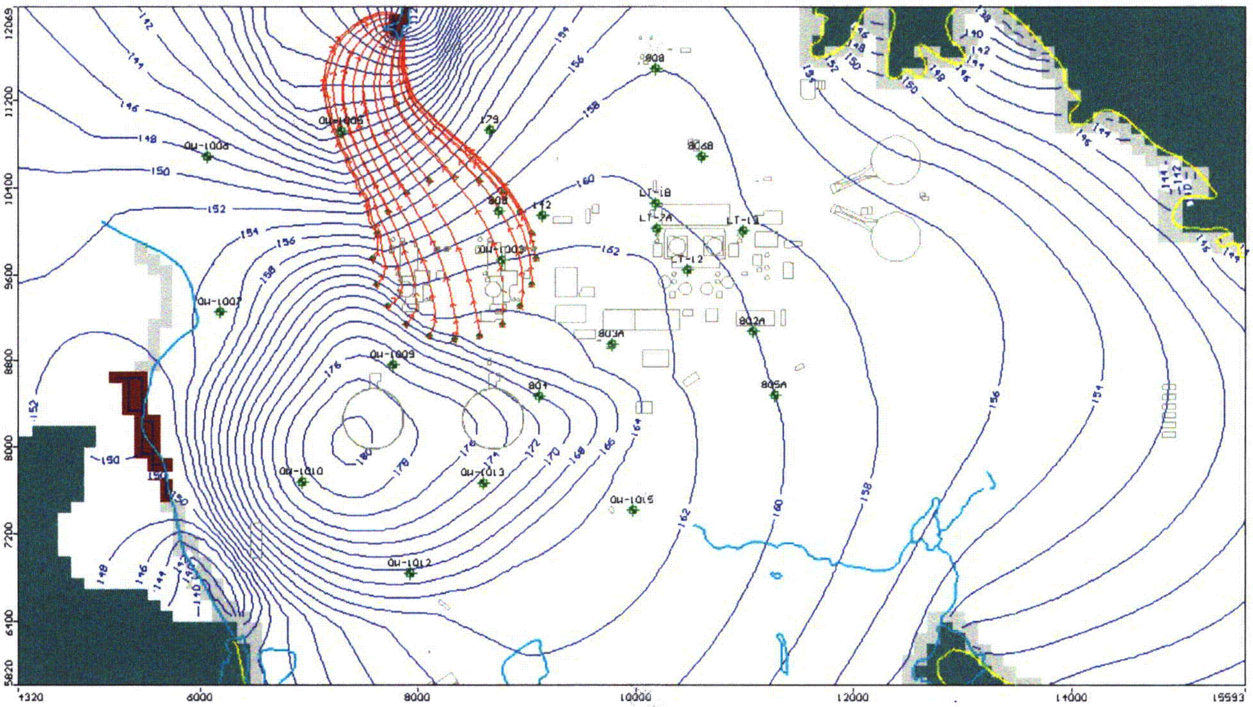


Figure 14 - Simulated heads and particle tracking with the baseline model, using the recharge distribution shown in Figure 9, and increasing the recharge in zone R_7 to 48 in/yr.

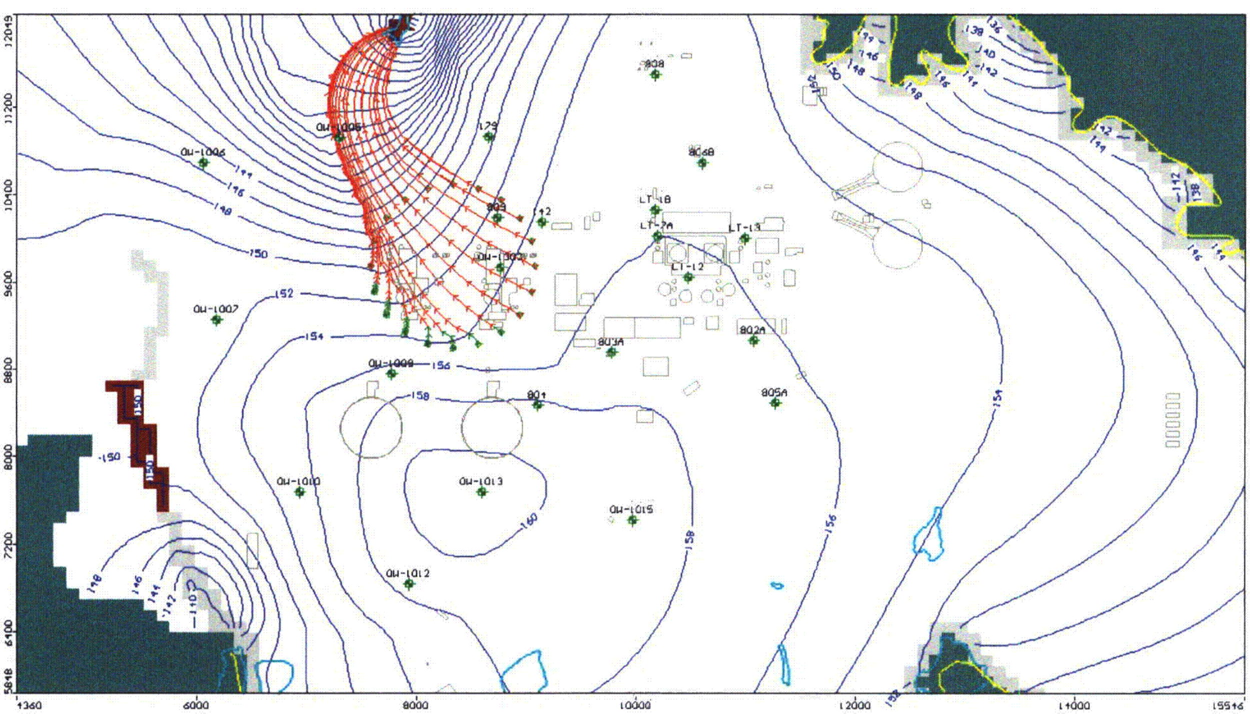


Figure 15 - Simulated heads and particle tracking with the baseline model, using the recharge distribution shown in Figure 9, and decreasing the recharge in zone R_7 to 0 in/yr.

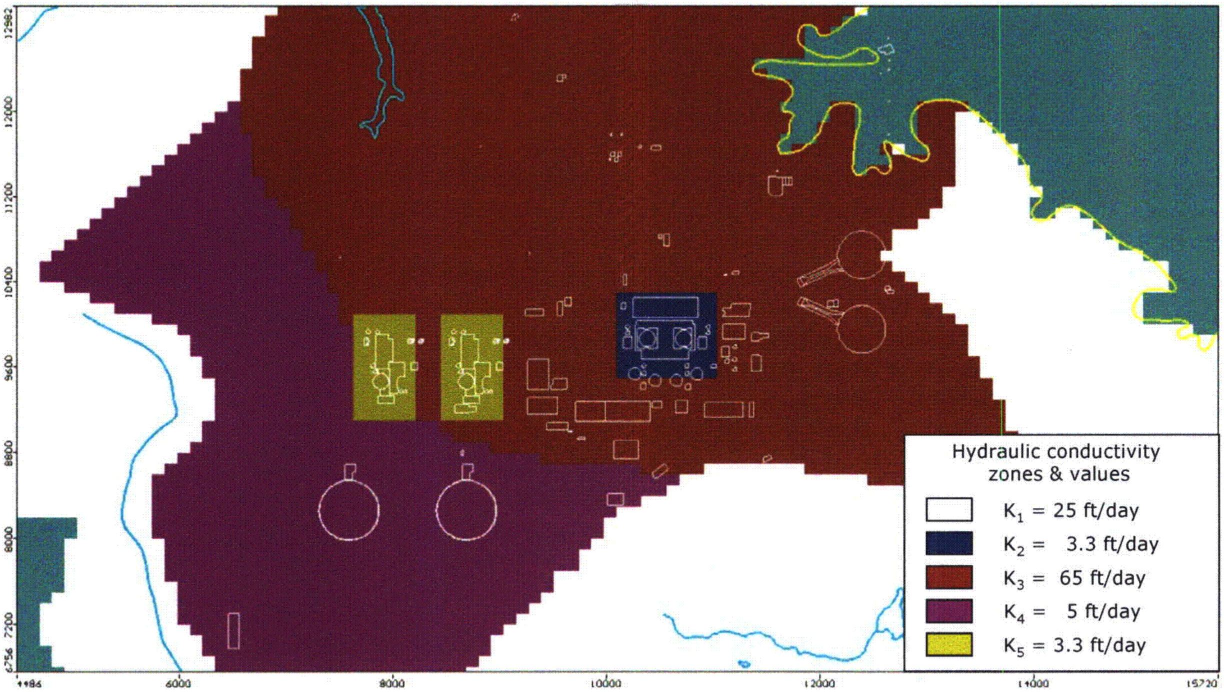


Figure 16 - Hydraulic conductivity zones for post-construction conditions.

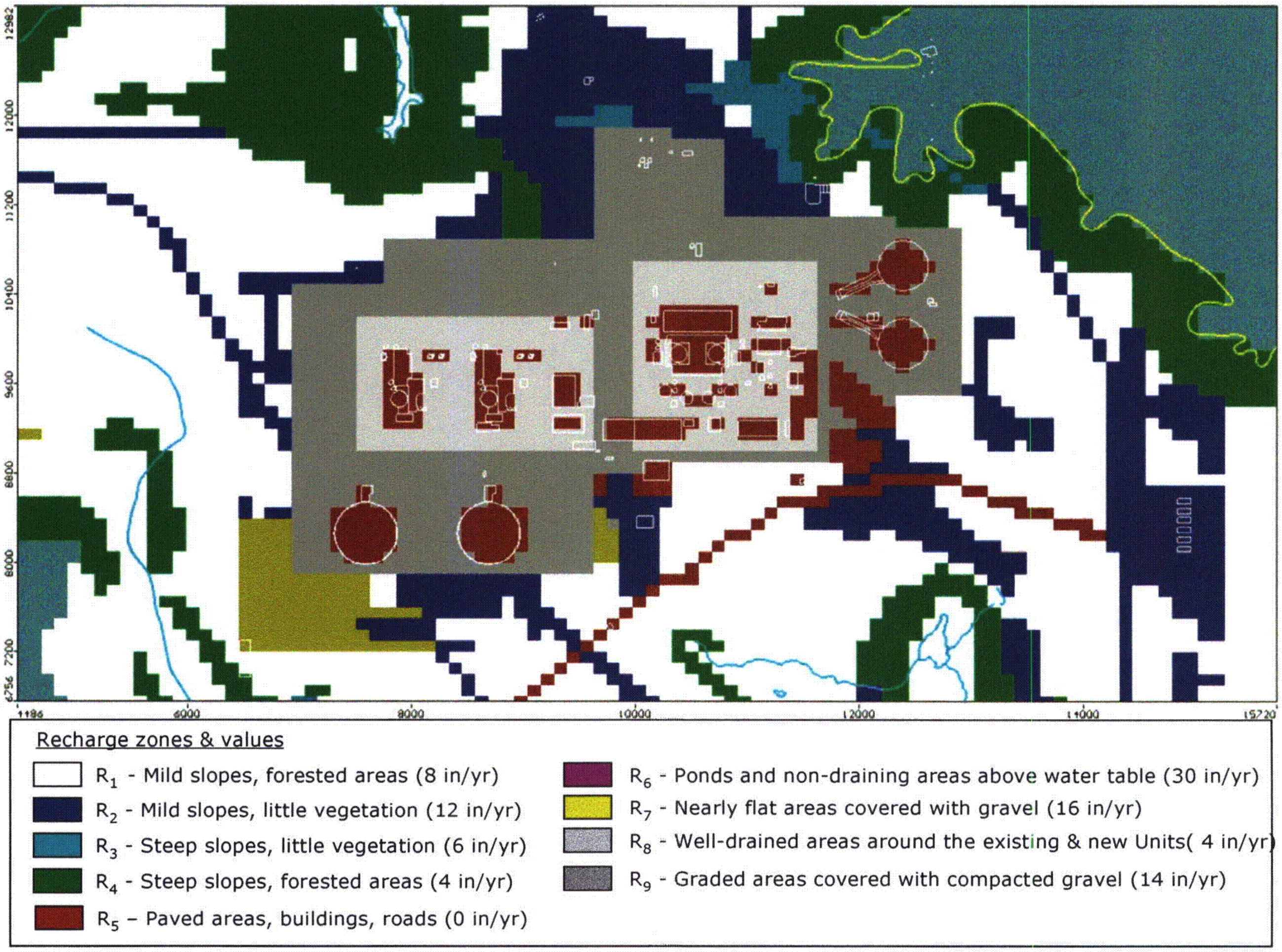


Figure 17 - Recharge zones for post-construction conditions

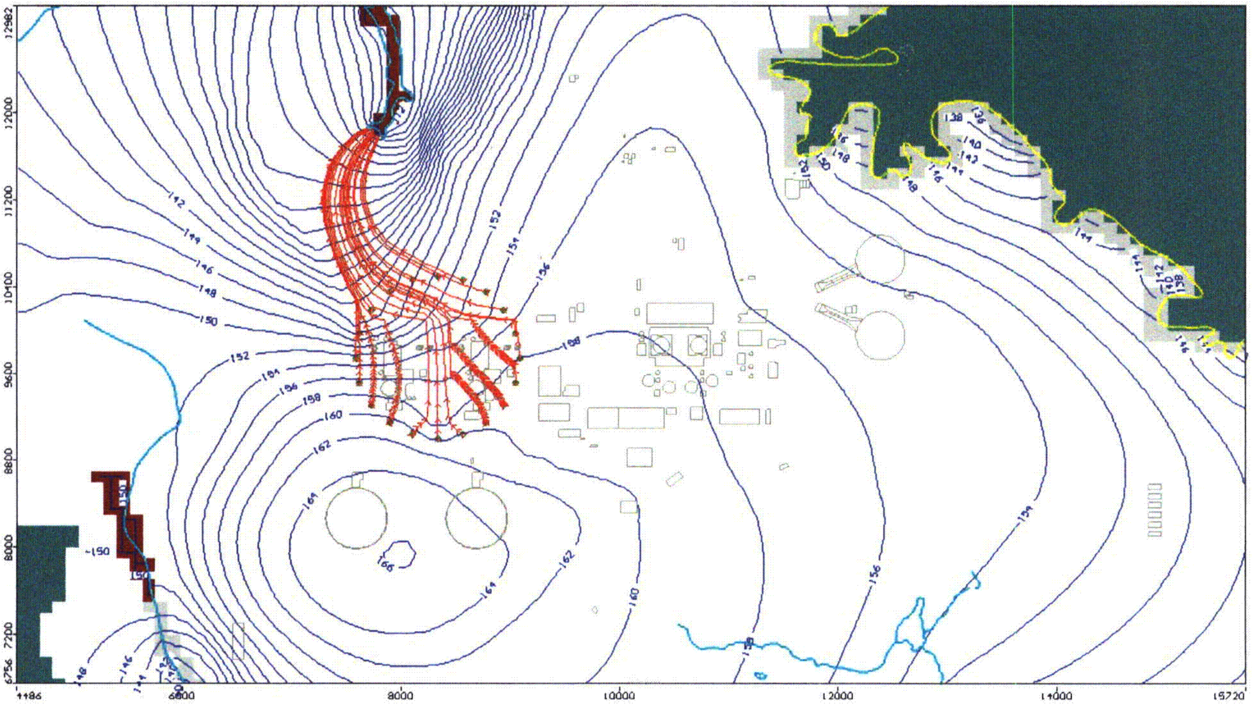


Figure 18 - Particle tracking under post-construction conditions. 20 particles are released along the periphery of 750-ft radius circle around the power block

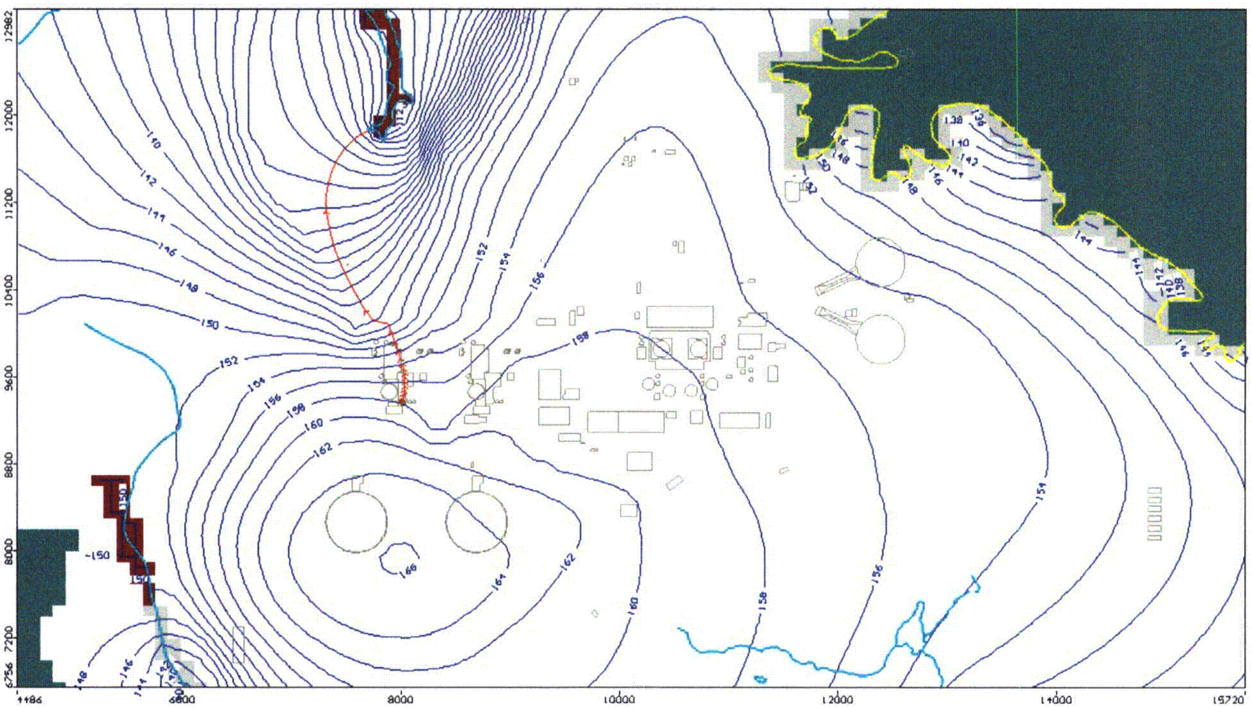


Figure 19 - Particle tracking under post-construction conditions. A particle is released at the auxiliary building of Unit 4.

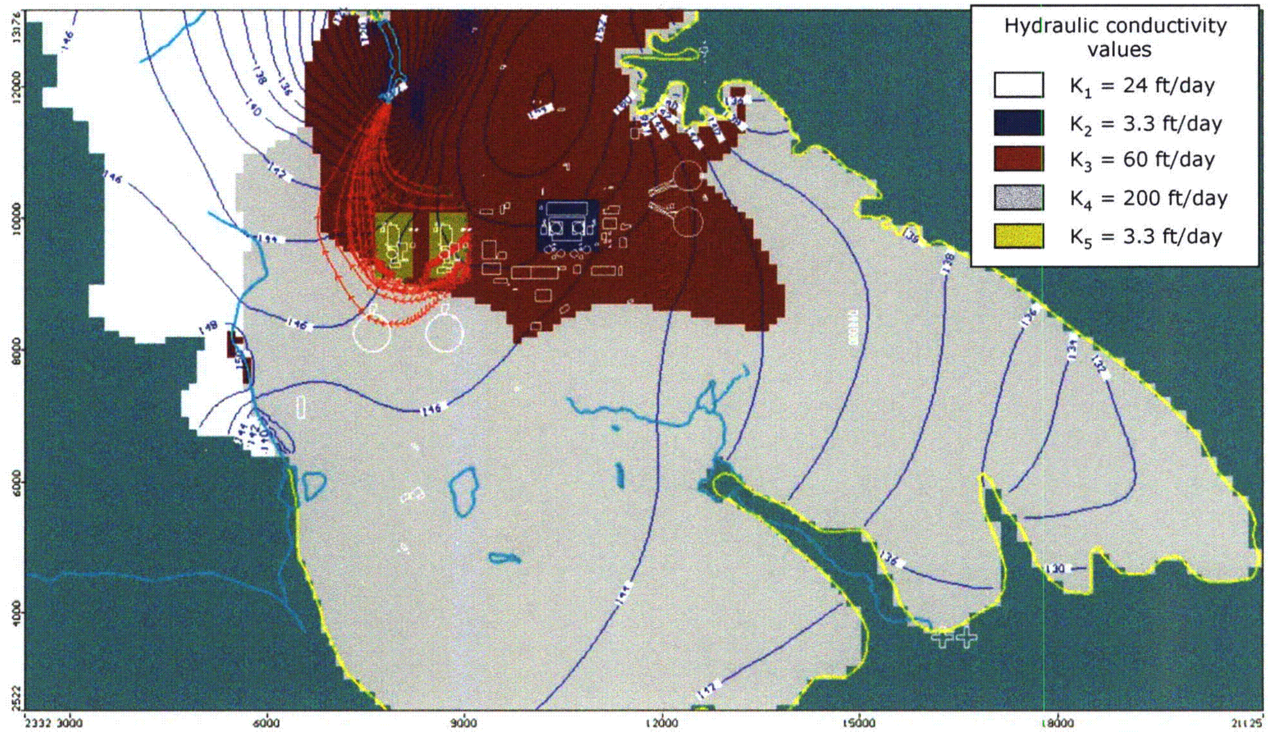


Figure 20 - Particle tracking for post-construction conditions using the same hypothetical high conductivity zone as in the simulation of Figure 10

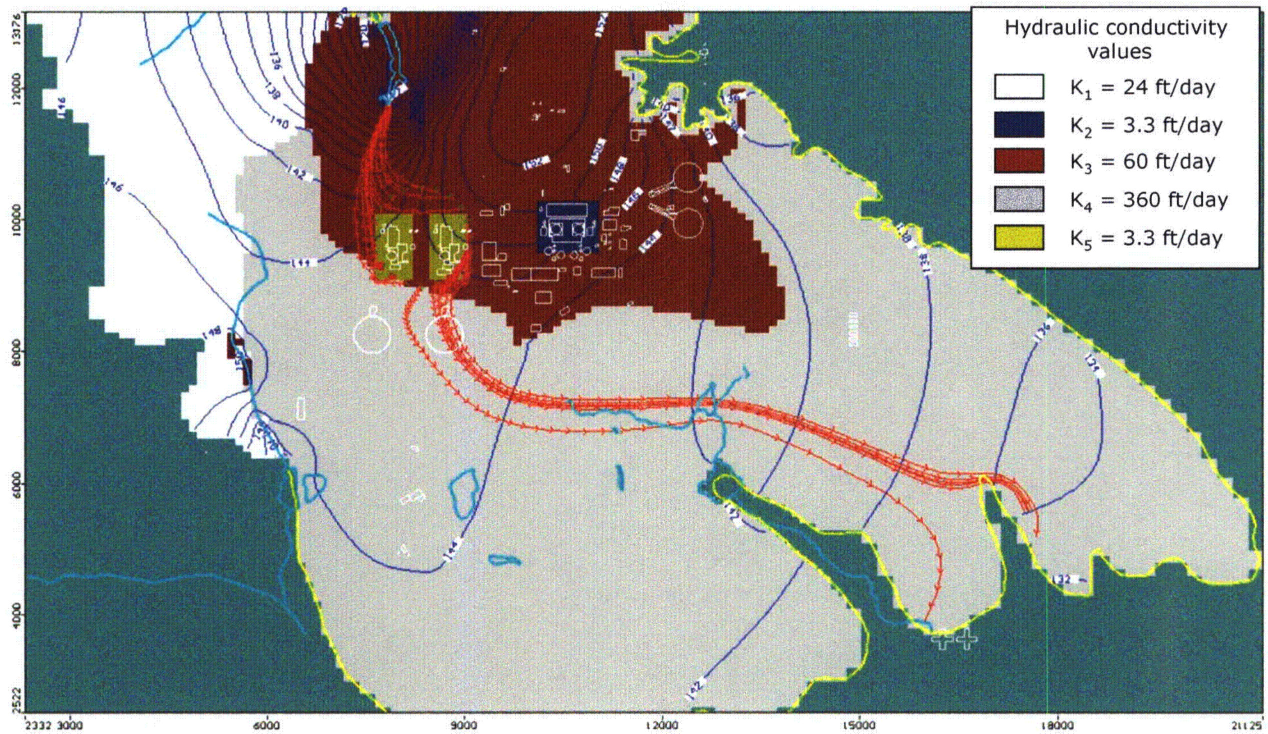


Figure 21 - Particle tracking for post-construction conditions using the same hypothetical high conductivity zone as in the simulation of Figure 12

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Enclosure 2

Groundwater Model Input / Output Files

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Enclosure 3

Updated SSAR Appendix 2.4B Revision 4-S2 Figures

Note: This enclosure includes four figures.

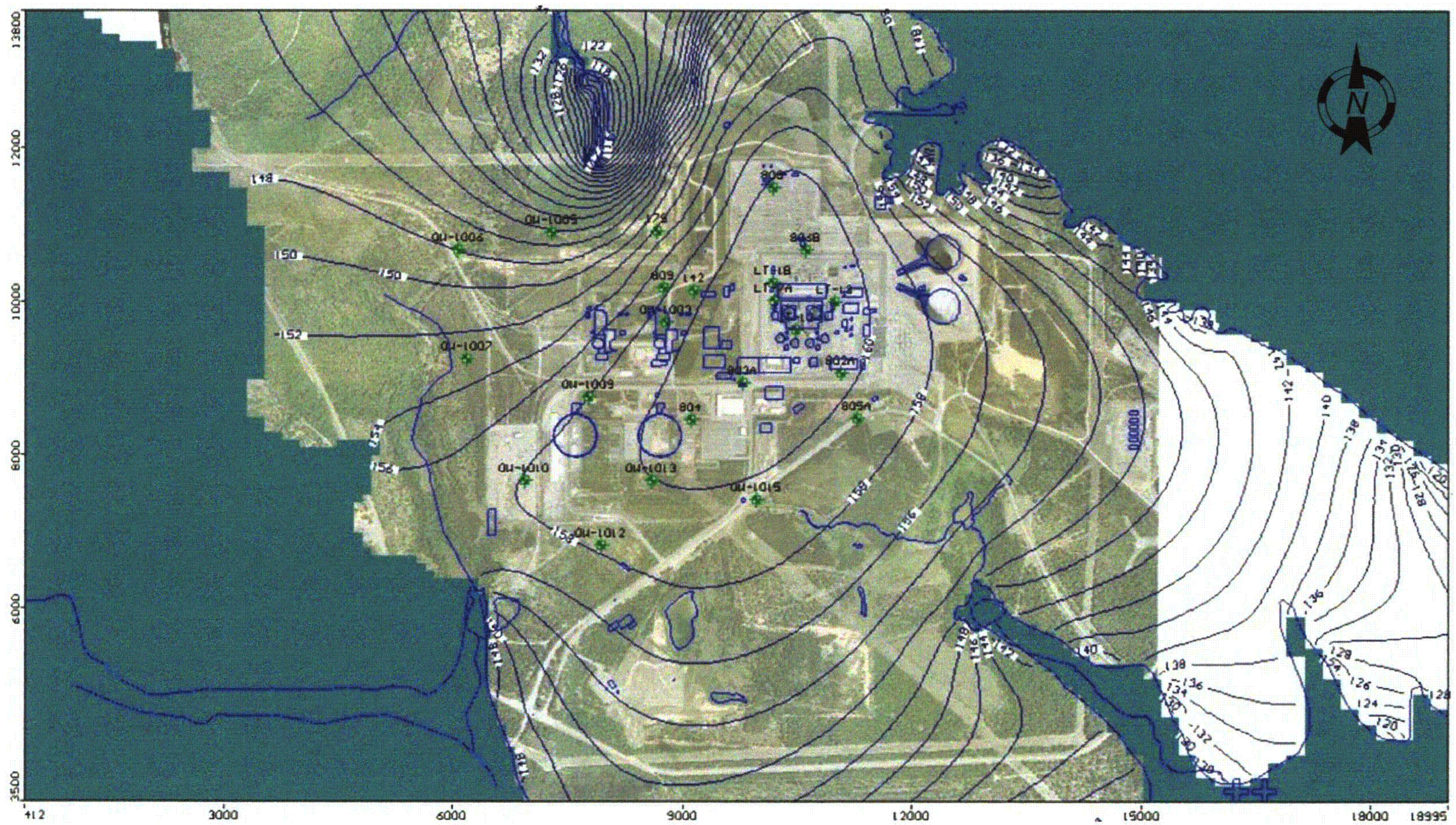

Figure 30: Model 3 - Simulated water levels for Run 305 (K_1=27; K_2=20; K_3=30; K_4=60 ft/day; R_1=10; R_2=6; R_3=6; R_4=4; R_5=0 in/yr)

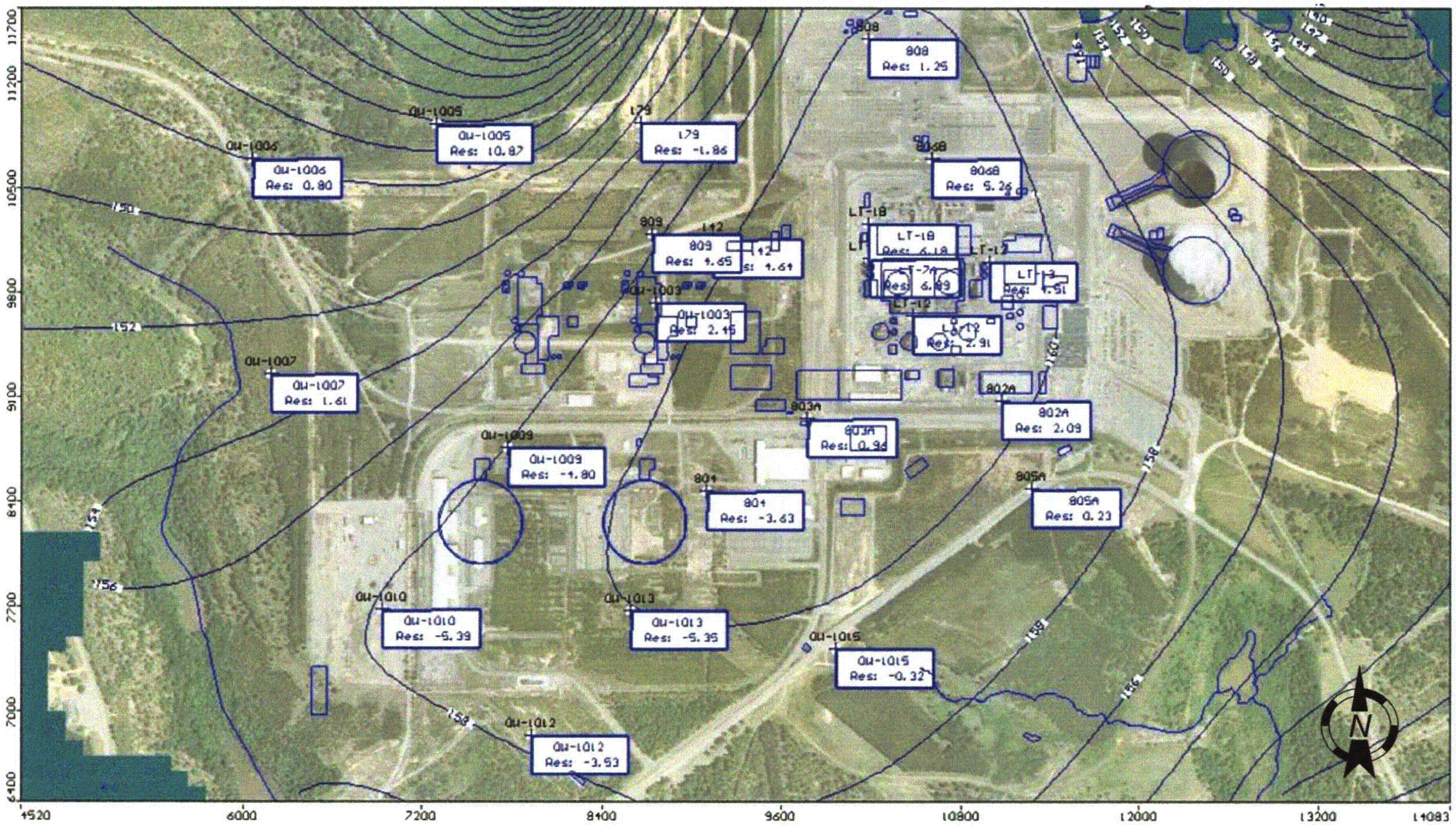

Figure 32: Model 3 - Estimated residuals for Run 305 (K_1=27; K_2=20; K_3=30; K_4=60 ft/day; R_1=10; R_2=6; R_3=6; R_4=4; R_5=0 in/yr)

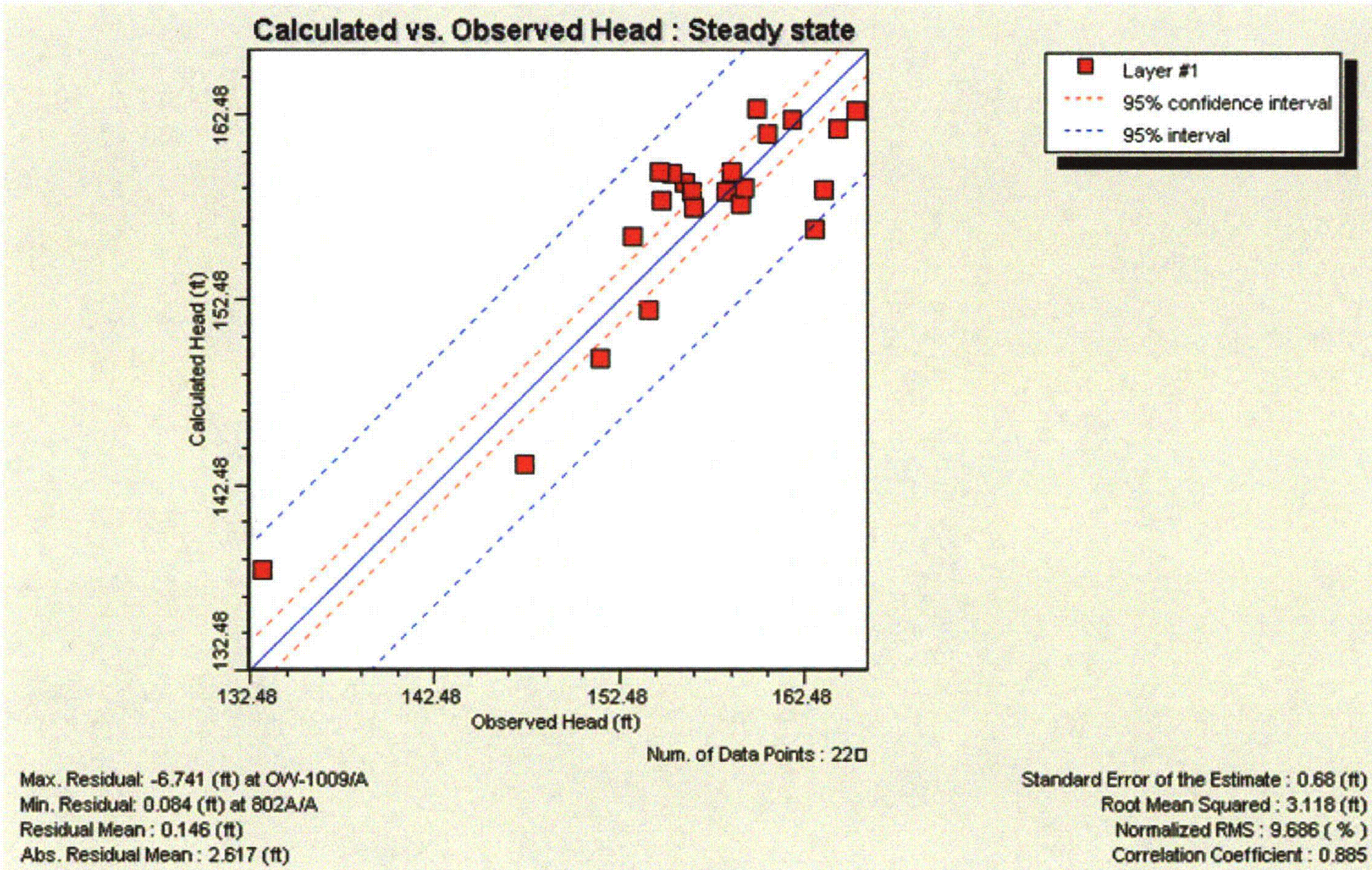

Figure 47: Model 7 - Simulated vs. observed water levels for Run 708 (K_1=32; K_2=100; K_3=8 ft/day; R_1=10; R_2=6; R_3=6; R_4=4; R_5=0 in/yr)

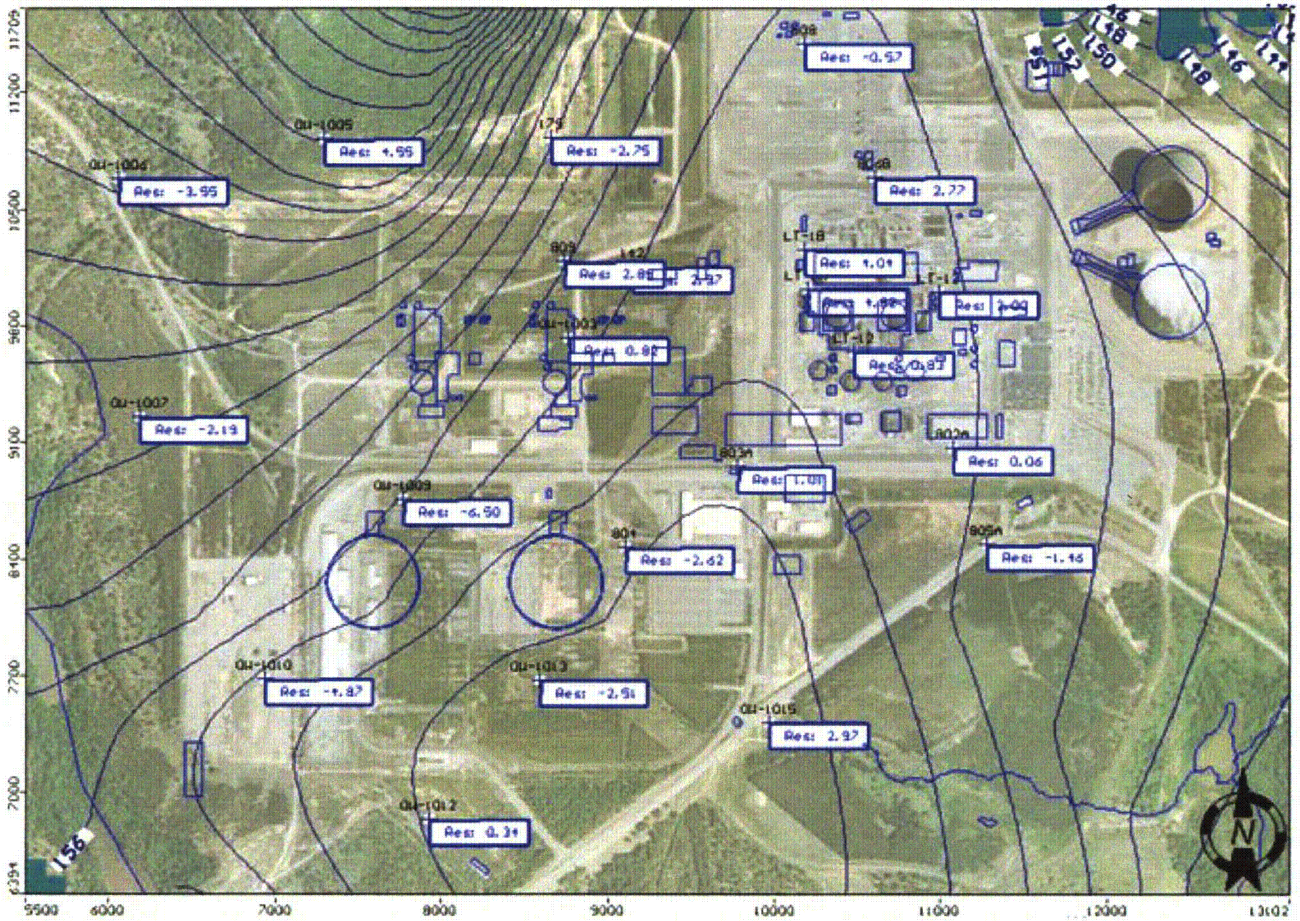

Figure 48: Model 7- Estimated residuals for Run 708 (K_1=32; K_2=100; K_3=8 ft/day; R_1=10; R_2=6; R_3=6; R_4=4; R_5=0 in/yr)