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TECHNICAL MEMORANDUM LAKE DRUID IMPACT ANALYSIS NTC ORLANDO FL
2/6/2001
CH2M HILL

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Lake Druid Impact Analysis Operable Unit 4, Area C, NTC Orlando, Florida

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DATE: February 6, 2001

The objective of this memorandum is to document the results of a groundwater modeling analysis performed to evaluate the potential future impact to Lake Druid from the proposed groundwater extraction system at Operable Unit 4, Area C, Naval Training Center, Orlando, Florida. The pumping of two wells, UVB-1 and UVB-2, is proposed to contain a groundwater plume of dissolved chlorinated hydrocarbon contamination emanating from Building 1100. The objective of the system is to mitigate migration of total contaminant concentrations above 100 parts per billion to the lake.

This modeling effort sought to quantify the volume of water that would be taken from Lake Druid in an effort to qualitatively assess the impact of the pumping wells. The original intent was to satisfy the St. Johns River Water Management District (SJRWMD) requirements for a Consumptive Use Permit. However, during the course of the modeling, SJRWMD informed CH2M HILL that a permit would not be required due to the benefit the project provides in address contaminated groundwater. The modeling effort was completed and this memorandum simply presents the results.

A three-layer groundwater model was used to evaluate potential impact. The model was developed and calibrated by the U.S. Geologic Survey (USGS). A detailed description of the model is presented in the USGS Water Resources Investigations Report 98-4110 (Assessment of the Potential Effects of Phytoremediation on Ground-Water Flow Around Area C at Orlando Naval Training Center, Florida, 1998).

The modeling effort consisted of the following principal concepts:

1. Extraction from each of the UVB pumping wells was distributed among the three model layers based on their transmissivity values at the well location. The assumed transmissivities for Layers 1, 2, and 3 in the model are 30, 200, and 1,600 square feet per day, respectively. An extraction rate of 5,775 cubic feet per day (cf/day) or 30 gallons per minute (gpm) for each of the wells was used to allocate 105, 700, and 4,970 cf/day for Layers 1, 2, and 3.
2. A control section was established between the lake boundary and the pumping wells (see Figure 1). It was aligned in the north-south direction approximately perpendicular to the groundwater flow direction. The length of the control section matches the projected length of the eastern lake boundary in the north-south direction.

3. To establish baseline conditions, the steady state calibrated model was run to simulate the groundwater system without an active extraction system. Flow across the control section was estimated to be 244 cf/day or 1.27 gpm. Figure 1 presents the water table elevation under natural conditions.
4. To estimate the conditions during pumping, the steady state calibrated model was run to simulate the groundwater system with an active extraction system (i.e., UVB1 and UVB2 pumping at 30 gpm each). Flow across the control section was estimated to be 191 cf/day or 1.00 gpm. Figure 2 presents the water table elevation under pumping conditions.

Based on this simple analysis, a decrease of 53 cf/day or 0.27 gpm in groundwater flow may be observed across the control section to Lake Druid. Hence, the upgradient inflow to the lake may potentially be reduced by this amount. In addition, under natural flow conditions, the lake discharges water to the groundwater system on the downgradient side. The total recharge to groundwater from the lake was estimated to be 25,627 cf/day or 133 gpm. As such, a loss of 0.27 gpm from the upgradient edge of the lake is negligible compared to the total loss of water from the lake under natural conditions.

Based on the above analysis, the overall impact on the Lake water budget will not be adversely impacted by the proposed groundwater extraction system.

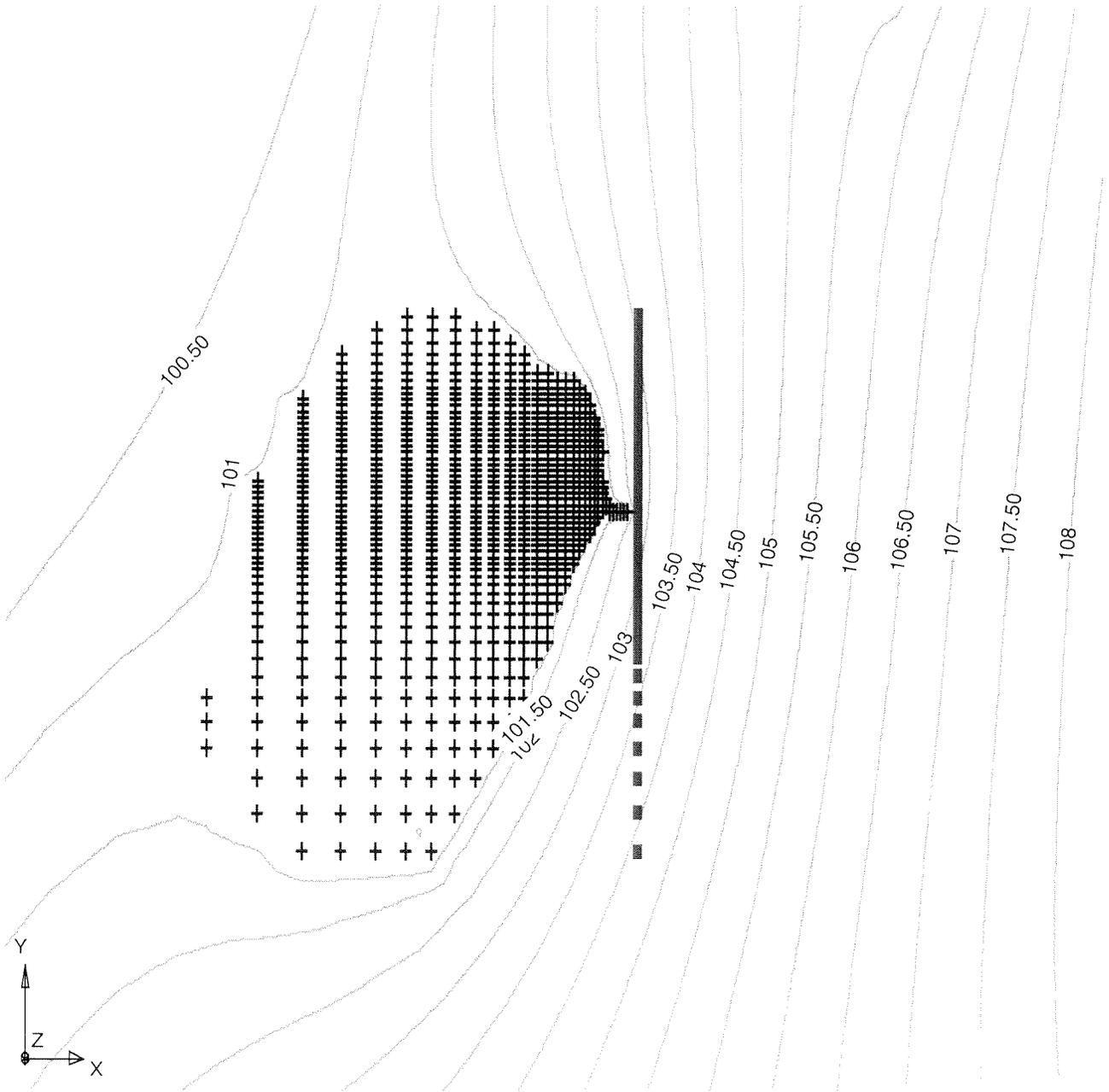


FIGURE 1
Groundwater Flow without Active Remediation

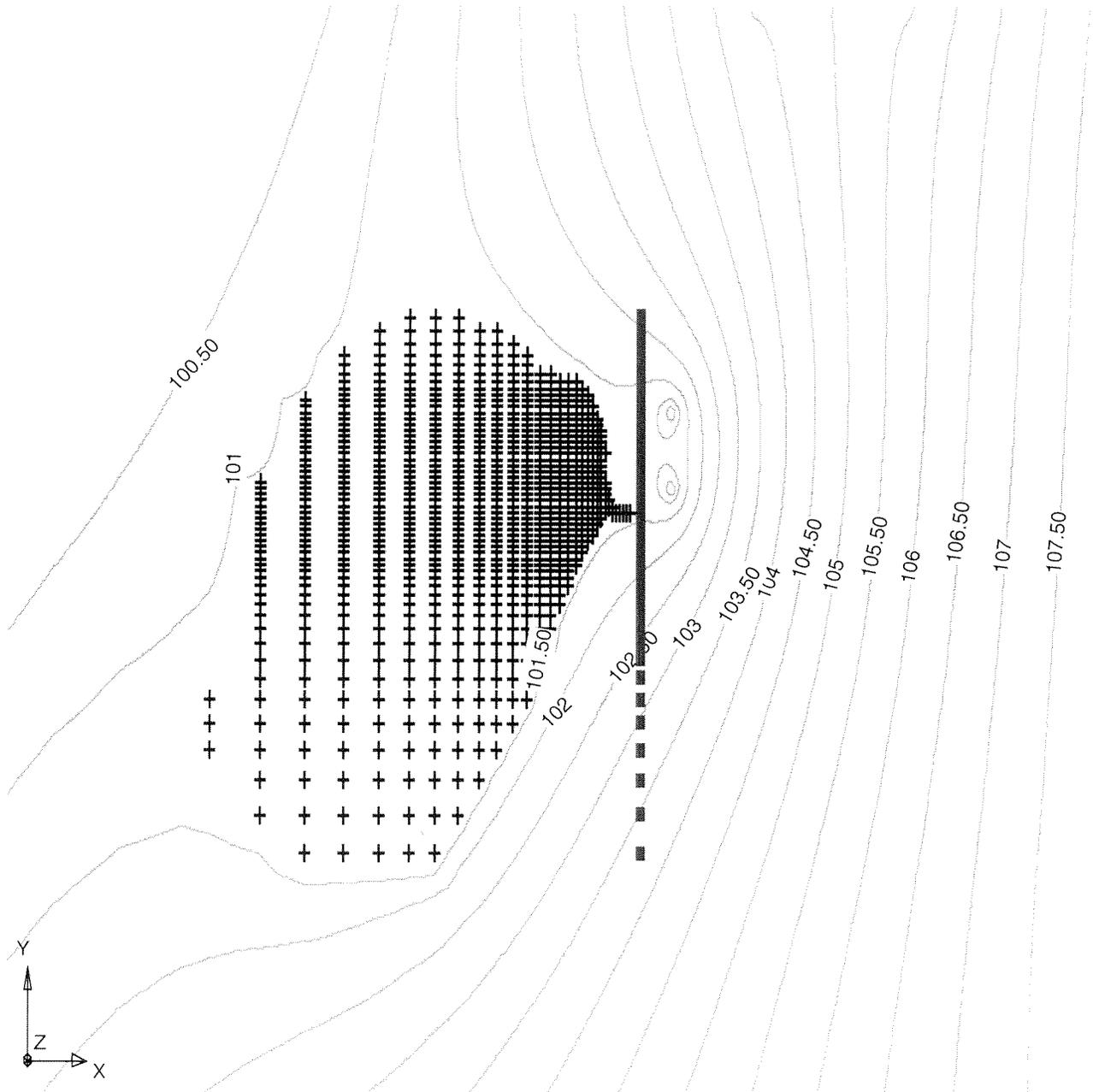


FIGURE 2
Groundwater Flow with Active Remediation

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Sent: Friday, February 09, 2001 11:28 AM
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Subject: OU 4 Modeling Results



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As you all may not know, the St. Johns Water Management District notified us a few weeks ago that a Consumptive Use Permit would NOT be necessary for the OU 4 retrofit. They based their decision on a re-review of the application, and the fact that our extraction was being done as part of a groundwater remediation project.

Prior to this determination (in response to one of the WMD's initial comments on the CUP application), we had been working on a groundwater model to determine the impact our system would have on Lake Druid. As soon as I received notice from St. John that we would not need a permit (and wouldn't have to respond to their earlier comments), I asked our modelers to wrap up their work and prepare a brief memo for the team to use in future design efforts at the site.

The memo is attached. If you have any questions, or need any additional information, please call.

thanks and have a nice weekend

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