EXHIBIT 21

October 4, 2005

From:
John (Jack) H. Humphrey, Ph.D., P.E.
Hydmet, Inc.
9855 Meadowlark Way
P.O. Box 678
Palo Cedro, CA 96073
530-474-1415 (fax also)
530-941-9584 (cell)
530-547-4743 (home)
Hydmetjack@aol.com

To:
John J. Fritsch, Esq.
Law Offices of David F. Beach, P.C.
100 Stony Point Road, Suite 185
Santa Rosa, California 95401
707-547-1690 (Fax 1694)
john@dfbeachlaw.com

Hidden Lakes Findings
Wood and Allegra v. Hidden Lakes Estates HOA, et al.

Site Inspections
There are two separate lakes, each approximately one acre in area. The lakes are located in the Granite Bay neighborhood community of Hidden Lakes Estates, near the east end of Douglas Blvd, immediately west of Folsom Lake State Park. The upper (north) lake is formed by a dam across a small stream, which was tributary to Linda Creek. Overflow from the north lake now flows south to the lower lake, which in turn spills south to a tributary of Linda Creek. Linda Creek, in turn, flows west to Dry Creek in Roseville, which flows west to the Natomas East Main Drain Canal and the American River in Sacramento.

Pictures of backyards were available from PSWD.
No wet areas were observed in yards in June-August 2005 visits.
The Intersection of Jon Way and East Hidden Lakes Drive had surface flow in culverts and ditches
Operation of Wood's collection system and pump was observed.
It cycled every few minutes and pumped out several gallons accumulated seepage.
Measurement of seepage outflow at Jon Way on July 25, 2005 was 1.23 gallons/minute (2 af per year) consistent with Wood's pump system operation.

Lake Water Balance

The most important parts of a water balance included:

- **A.** Inflow from the surrounding residential watershed to the two lakes. Most of the inflow occurs from the tributary on the east side of the north lake. (Watershed area is approximately 8 acres)
- **B.** Precipitation directly on the lakes (Lake areas 1.1 ac north, 1.0 ac south, total 2.1 acres)
- **C.** Evaporation loss from the water surfaces (2.1 acres)
- **D.** Purchased water to maintain 2.1 acres of full lake level and 1.5 acres of landscaping.
- **E.** Seepage loss through the north lake dam (at least 1.23 gallons/min)
- **F.** Other losses to regional groundwater from both lakes
- **G.** Outflow from the south lake (during winter rain events)

A monthly water balance for the lakes was estimated for average annual conditions of precipitation, evaporation and runoff. Runoff from the watershed (A) was estimated from the area of the watershed, and mean annual runoff from

HLE EXHIBIT 21

Dry Creek (USGS gage No. 11447293) . Average monthly precipitation (B) was derived from the Folsom Lake precipitation gage. Average monthly evaporation (C) was estimated from pan evaporation records published by the California Department of Water Resources, corrected with theoretical pan coefficients, relating lake evaporation to pan evaporation. Lake evaporation is 70-100% of pan evaporation, with higher coefficients in fall and lower coefficients in spring due to thermal lag of lake water temperature compared to the pan. Purchased water (D) was estimated from records provided by the homeowners association and also calculated from the water balance. A lower limit to seepage (E) was determined by measurements taken in a drainage ditch which collects seepage at Jon Drive. The summer portion of the water balance, when precipitation and runoff were negligible, showed that other seepage losses (F) to groundwater were significant, and nearly twice those measured at Jon Way. Outflow (G) occurred whenever the south lake level exceeded its outlet elevation, normally during the November-April wet season.

The average annual water balance calculation showed that:

(A) Runoff to the lakes was 8.0 ac-ft per year or approximately 25% of precipitation.
(B) Precipitation on the lakes surface was 4.5 ac-ft
(C) Evaporation from the lakes surface was 10.0 ac-ft.
(D) Purchased water to maintain the lake water level April-October was 12.8 ac-ft (4.2 mg)
(E) Observed seepage loss was 2.0 ac-ft, measured at Jon Way
(F) Additional seepage loss to groundwater of 2 to 4 ac-ft was required for a reasonable lakes balance
(G) Outflow from the south lake November-March was 4.8 ac-ft.

Total annual pre-development runoff for the lake area of 2.1 acres would be 2.1 ac-ft. The difference between lake precipitation and evaporation is 5.5 ac-ft. Compared to pre-development conditions, lake outflow was reduced by net lake evaporation by 3.4 ac-ft. However, purchased water makeup to maintain lake level from seepage losses in April-October increased lake outflow by 3.5 ac-ft, for no significant annual change in runoff reaching Dry Creek. In other words, net evaporation losses due to the lakes is compensated for by the water purchases.

Lake seepage reduction alternatives. The lake water surface elevations (higher north) and original ground topography make it unlikely that there is significant subsurface flow from the south lake to the north lake. The south lake may have significant seepage losses, however they do not affect the plaintiffs. Therefore, leak reduction alternatives are recommended for the north lake only. The bottom surface area of the north lake is approximately 1.2 acres. Some seepage is expected and is even desirable for earth dams. Seepage losses up to 1" per month (2.1 ac-ft) are considered good. Up to 2 ft/year (4.2 ac-ft) is considered acceptable. Seepage loss from the north lake is in the range of acceptability.

The condition of the pond bottom and sides is not known. Uneven bottom materials can significantly increase the cost of all liner installations.

1. **Bentonite application on the north lake dam.** The original lake plans specified some bentonite (sodium bentonite, mostly montmirillonite clay) application to the face of the dam. Drilling on the plaintiff's property noted some subsurface material, which was similar to bentonite, and could have percolated in seepage zones through the dam. With a new 12" application, significant reduction in seepage is likely, especially if seepage zones can be identified after lake drainage and bottom exposure. Cost Estimate: $10-20,000
2. **Bentonite cover on the entire north lake bottom.** This alternative has an application rate of 12 inches over 1.1 acres and includes the cost of lake draining, bottom grading and smoothing. Other studies have shown average leak reduction averaging 94%. Cost Estimate: $50-60,000
3. **Combination of bentonite and PVC plastic liner.** Bentonite can be very effective in stopping seepage. However, if leaks are concentrated in certain areas, a 6ml PVC plastic liner under the bentonite may be required to insure no leaks develop though the bentonite. Note that the original bentonite application on the dam face may not have been fully effective because water pressure was able to force bentonite entirely through high seepage zones. Cost estimate: $70-80,000
4. **Geosynthetic liners of various types.** Geosynthetic liners of synthetic rubber and plastic such as Hypalon CSPE, 30 ml PVC, HDPE, EPDM and polypropylene can guarantee nearly 100% control of seepage. However, the liner needs careful site preparation to avoid fabric stresses. In addition, recreational and

HLE EXHIBIT 21

wildlife activity can potentially damage the liner. At any rate, lifetimes for synthetic materials are not promised beyond 20 years. A serious concern using an impervious liner is that subsurface flow, especially during winter runoff, can occur from below the liner, and float it, leading to damage. Liner costs range from $0.80 to 1.20 per square foot plus site preparation. Cost estimate: $80-100,000

Plaintiff's Reports

HTA Science & Engineering, Inc. Report to Tony Wood September 26, 2005 on 7884 Jon Way Backyard Shallow Groundwater Level Assessment.

Youngdahl Consulting Group, Inc. Report to Michael Thomas on Geotechnical Reconnaissance Related to Subsurface Water Conditions August 18, 2003.

ENGEO Inc. Report to Tony Wood May 28, 2003 on Preliminary Geotechnical Reconnaissance.

HLE EXHIBIT 21